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ABSTRACT

This document contains the following papers on educational leadership programs and technology: (1) "Technology Standards for School Administrators: Implications for Administrator Preparation Programs" (Warren C. Hope, Bernadette Kelley, and Janet A. Guyden); (2) "Information Technology and the Transformation of Leadership Preparation Programs: A Response to Calls for Reform in Educational Practice" (Ian W. Gibson); (3) "Graduate Technology Coursework in a Framework of Professional Leadership" (Perry Rettig, Penny Garcia, and Scherie Lampe); (4) "Professional Development for Systemic Change: A Strategic Approach to Scaling Educational Reform through Professional Development Programs" (Stephen Best, Ronald Marx, Barry Fishman, and Deborah Peek-Brown); (5) "TLI: Recreating University Programs To Meet School District Needs" (Carolyn Rude-Parkins); (6) "'The Usual Suspects': Explaining Success and Failure in Instructional Technology Consortia" (Steven F. Jackson, Dolores Brzycki, and Mary Ann Cessna); (7) "ICT Training and Implementation: Inseparable Activities" (Reg North); (8) "Attitudes towards Using Computers in Administration among School Administrators" (Ahmad Rafee Che Kassim and Hatim Mohamad Tahir). (Contains 118 references.) (MES)

EDUCATIONAL LEADERSHIP

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Seven articles in this section are grouped in the following way: (a) a response to state, regional and national technology standards and their implication for leadership training; (b) the challenge of national reform through changes in university graduate degree programs; (c) grant initiatives to promote partnerships among universities and schools; and (d) the results of a pilot training model. All of these articles are valuable reports to increase ones knowledge of the challenges encountered while leading reform efforts, training reform agents, or developing university/school partnerships.

The first article compares the standards promulgated by state and educational organizations for technology in the classroom and the necessary educational leadership training to embrace these standards. Warren Hope, Bernadette Kelley, and Janet Guyden of Florida A&M University presents as the "key component" the administrators' level of expertise and associated abilities for utilizing educational technology. The article provides suggestions for incorporating these standards into university leadership training programs.

The second group of two articles highlight new and radically different graduate degree programs as necessary to meet technology reform initiatives. Ian Gibson asserts that upon completion of the Wichita Sate University's Educational Doctorate program students become "visionary leaders of schools of the future" through an "immersion" in various technologies. Students participate in variety of classroom settings and roles. Perry Rettig, Penny Garcia, and Scherie Lampe describe in their article a new Master's of Education degree at the University of Wisconsin Oshkosh. The program, called the Caring Intellectual Leader Model, focuses on the problem-based learning while incorporating technology throughout all levels of instruction and assessment. Two degree strands are described. One prepares teachers to use technology in their classrooms efficiently and the other prepares educators to certify as district technology coordinators.

The third group of articles report results from specific grants having in common university and school district partnerships. Steven Best, Ronald Marx, and Barry Fishman of the University of Michigan, and Deborah Peek-Brown of the Detroit Public Schools report their findings from a National Science Foundation grant to provide systemic reform to middle school science. Challenges of a large-scale undertaking are presented. Carolyn Rude-Parkins presents the design of the Technology Leadership Institute (TLI), a project initiated through the BellSouth Foundation's Recreating Colleges of Teacher Education. A partnership between the University of Louisville and the Jefferson County Public School District, the TLI is a collaborative effort to provide new levels of technology expertise for teachers and leaders. Steven Jackson, Delores Brzycki and Mary Ann Cessna of the Indiana University of Pennsylvania reports successes and failures from their project called Advancing the Development of Educators in Pennsylvania through Technology Training (ADEPTT). Their project, funded by Bell Atlantic and Microsoft Corporation, is a collaboration of three institutions of higher learning and fifty-three school districts. Suggestions are provided for such a large project to be successful.

The final article, Reg North presents an evaluation of a multimedia CD-ROM based training program conducted by the University of Ulster in Northern Ireland to senior secondary staff in four school sites. Valuable lessons from the training design were learned and reported.

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Technology Standards for School Administrators: Implications for Administrator Preparation Programs

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Abstract: As technology continues to have a significant role in schools, it becomes increasingly important for educators to acquire knowledge about understanding its power and capabilities and skill to use its features. Although school administrators are busy people, they are not exempt from knowing about technology's power and capabilities. As instructional leaders, it is important for them to demonstrate understanding and familiarity with the features and capabilities of technological devices. In the thrust to integrate technology into schooling, school administrators' level of expertise and ability to facilitate technology's integration into the curriculum emerges as a key component. Recently, technology standards depicting what teachers and students should know and be able to do with technology have been promulgated by states and educational organizations. Technology standards are also being advanced for school administrators. This paper identifies technology standards for school administrators and relates some of the implications those standards have for administrator preparation programs.

Background

Technology is reshaping work environments in virtually every enterprise in American society. Technology enables a more efficient method to accomplish tasks and communicate information. Technology can influence the teaching and learning processes that occur in schools. Electronic devices are being used to deliver subject matter and assist students to acquire technology competencies. Technology has also influenced administrative processes that are necessary for a school to function. Budget preparation, information storage and retrieval, reporting, and communicating with stakeholders have been made more efficient by using technology.

Electronic devices and software applications that tell them what to do can perform more efficiently and in less time many tasks previously accomplished with paper and pencil. And, the versatility, that is, the many different tasks that can be accomplished efficiently, makes using technology a realistic advantage. Technology is being used to word process documents, manipulate numbers in a spreadsheet, sort information in a database, and retrieve information from other computers. It can also be applied to other productivity and problem solving situations. Technology also supports dynamic and interactive presentations, and professional development can be facilitated via video-conferencing negating the need to travel long distances.

Given technology's complexity, its various configurations, and the many tasks it can accomplish, it is safe to say that it is impossible for one person to be proficient in all that technology can be applied to. So, a question is asked, "Are there some basics guidelines that specify a minimum level of skill in using technology"? This question is best answered in the context of the role or profession of the individual.

Recently, in education, there have been efforts by some states, namely, Nebraska and Virginia, and some educational organizations, the International Society for Technology in Education, to develop technology standards, which are in effect guidelines describing what teachers should be able to accomplish using technology. Right now, the technology standards movement seems to concentrate primarily on students and teachers. Much of the literature on technology standards specifies what students should be able to do using technology at various grade levels and what teachers should be able to do with technology.

Although it is established and well publicized that principals are key actors in the process of integrating technology into schools and facilitating teachers' adoption and use of it (Cooley & Reitz, 1997), they have

remained on the fringe of technology professional development (training). This is evident in schools' and districts' professional development (training) for the use of technology where the concentration is on teachers. The technology professional development needs of school administrators (principals) have received less attention (Hope, Kelley, & Kinard, 1999). And, it appears as though school administrators (principals) are also being neglected in the technology standards movement.

Technology Standards for School Administrators

There are a few organizations that have proposed technology standards for school administrators. The Interstate School Leaders Licensure Consortium (ISLLC), the National Council for Accreditation of Teacher Education (NCATE), and most recently, the Southern Regional Education Board, Each organization has identified standards that it believes school leaders should have in their arsenal of abilities. The ISLLC identifies two performance standards directly related to principals' ability to use technology. ISLLC standards list performance indicators that state that the administrator facilitates processes and engages in activities ensuring that technologies are used in teaching and learning (Standard 2) and that there is effective use of technology to manage school operations (Standard 3).

NCATE Program Standards for Educational Leadership address what a program should prepare the school administrator to do. Standard 9 focuses specifically on Technology and Information Systems and relates that programs should prepare school leaders who demonstrate an understanding of and the capability to use technology, telecommunications and information systems to enrich curriculum and instructions; apply and assess current technologies for school management and business procedures; and develop and monitor long range plans for school and district technology and information systems, making informed decisions about computer hardware and software, and about staff development, keeping in mind the impact of technologies on student outcomes and school operations.

The Southern Regional Educational Board (SREB) proposes an extensive standards model for school administrators to provide effective leadership in their schools. The standards in the proposed model cover a range of school administrator roles and responsibilities. According to the SREB, school administrators would be expected to:

1. Understand the elements and characteristics of long-range planning for the use of current and emerging technology—infrastructure, budgeting, staff development, technical support, personnel, and upgrades;
2. Demonstrates ability to analyze and react to technology issues, concepts, and proposals—community and corporate pressures;
3. Possesses a "big picture" vision of technology in education and schools—reform movement, competency-based education, standards, time allocation;
4. Uses technology to efficiently communicate with stakeholders—voice mail, e-mail, newsletters;
5. Uses technology to collect and analyze data and other information to improve decision making and other management functions—student academic achievement tests, gather data on variables not previously gathered, access to global information;
6. Understands how current and available technologies can be effectively integrated into all aspects of the teaching and learning process—application of software and connectivity to each instructional area, access to research information, multi-media presentations;
7. Understands the legal and ethical issues related to technology licensing and usage—purchasing agreements, safety and security issues;
8. Uses technology appropriately to fulfill their roles of coordinator and communicator of school programs and activities—manage the school enterprise efficiently, present information effectively to stakeholders, improve decision-making and consultation processes.

Administrator Preparation

The ISLLC, NCATE, and SREB's standards are broad and quite general. It is therefore necessary for college and university administrator preparation program faculty members to interpret and translate these standards into discrete activities and experiences in course offerings. To deliver a program that provides aspiring administrators with opportunities to acquire and demonstrate the skills specified in the technology standards require professors who are familiar with numerous electronic devices and are knowledgeable about

administrative and instructional technology applications. It is also essential that they have access to state-of-the-art hardware and appropriate software applications that enable them to engage students in experiences that coincide with the administrative, managerial, and instructional leadership tasks practicing school administrators are performing in schools.

Much has been said and written regarding the perceived disconnect between what takes place in college and university classrooms and what is actually transpiring in k-12 schools. Often, it is noted, the learning being offered students at the college and university level is inconsistent with what occurs daily in k-12 classrooms. Incorporating technology standards into administrator preparation courses can be an intervention that ameliorates the discontinuity between college and university preparation and realities in k-12 schools.

Avenues for school administrators to acquire technology expertise are college and university preparation programs, through their own efforts to improve in the area of technology, and through school and district sponsored professional development activities. It is not known how well college and university preparation programs actually prepare aspiring school administrators to demonstrate the technology standards set forth by ISLLC, NCATE, and SREB. There can, however, be an equating of technology standards with the life cycle of an innovation, a new policy, or a new curriculum program. The comparison is that they are all conceived, initiated in an environment with some staff development, and then left to individuals to implement.

Often, a minimal amount of information is fed back to the initiators about how well an innovation, a policy, or program implementation is taking place and the extent of impact on the intended target. How well are administrator preparation programs meeting the intent of technology standards through course work? Are aspiring administrators prepared through course work experiences to demonstrate the competencies and skills designated by technology standards when they exit administrator preparation programs? Research needs to be done that shows how well colleges and universities are preparing aspiring school leaders with the technology skills specified by the aforementioned organizations.

There is a need for colleges and universities to do follow-up with graduates who become school administrators. This follow-up can provide information on graduates' perceptions of how well the program prepared them to assume the technology leadership role in their present capacity as a school leader. A challenge to administrator preparation programs is to be able to provide high quality learning experiences that approximate what school leaders will likely experience in their districts of employment. It must be mentioned also that administrator preparation programs can do a good job in providing aspiring school administrators with necessary technology skills, however, once an individual is in a district and at a school, the technology facilities and availability of professional development opportunities may not lend to the continuing development of the individuals technology skills.

Faculty, Facilities, and Technologies

Faculty

As with all programs, who delivers the training is as important as the content to be delivered. College and university administrator preparation programs should have a commitment to students achieving the technology standards promulgated by ILLSC, NCATE, and SREB. Furthermore, professors should be aware of the technology standards and possess an advanced level of expertise in understanding and using technology. It is inappropriate to expect students to acquire certain technology skills and hold them accountable for demonstrating technology standards when those who are presenting the content and facilitating skill acquisition do not possess the expertise to provide the appropriate instruction in technology. It is important for administrator preparation programs to have professors who are knowledgeable of and can use technology to teach how it can be used to support (a) administrative and managerial task accomplishment, (b) personal productivity, (c) achievement of curriculum objectives and students' learning outcomes, and (d) teachers' integration of technology into their practice. Moreover, professors should have working relationships with k-12 schools and possess an awareness of how technology is being used in instruction and administration. This relationship can address several key issues. One, it becomes an intervention for the perceived inconsistency in teaching and learning in colleges and universities and the realities of k-12 schools. Two, it enhances the probability that aspiring school administrators will receive training that resembles what is actually occurring in schools. And three, the college, university and k-12 school relationships achieves the intent of ILLSC, NCATE, and SREB technology standards.

Facilities and Technologies

An academic program that effectively prepares students to fulfill school leadership roles begins with excellent facilities. This is especially true considering preparation to become technology leaders in schools. To provide instruction that leads to students' acquisition of ILLSC, NCATE, and SREB technology standards, administrator preparation programs should have access to facilities that have up-to-date technologies—computers in sufficient quantity, writeable CD-ROMS, scanners, printers, telecommunications capabilities, projectors, and a variety of software.

Technology rich environments are spacious, well designed, and provide various stations that focus specific technological devices on their administrative and instructional uses. Activities in administrator preparation programs should approximate what school administrators are actually doing in schools. For instance, if aspiring school administrators are learning about instructional uses of technology, and in particular, an Integrated Learning System (ILS), then students should have access to an operational ILS in order to experience its design and capabilities. If the learning to take place concerns an administrative task such as accessing a database for information, then students should have access to a database of information and practice accessing and retrieving specific data. It is important also, that aspiring school leaders practice with hardware and applications that are currently used in their district's schools. This may entail arranging a partnership with school districts so that students have an opportunity to acquire knowledge and familiarity with the district's Management Information System and other technology applications.

If instruction focuses on using technology for productivity purposes, then students should have access to a computer system, necessary peripherals and software. It is unlikely that school districts will use the same hardware and software. This presents another challenge to administrator preparation programs. Today, a majority of schools use technologies based on Windows 95 and 98 and the Macintosh operating systems. This becomes an opportunity for students to assist the program by informing professors of the various software and platforms being used in a district. Program coordinators using this information can plan for hardware and software acquisitions to enhance program delivery.

In a final analysis, preparing aspiring school administrators with technology competencies require programs to provide students with engagements that assists them in understanding technology's role in teaching and learning and in accomplishing administrative tasks. These experiences ought to include practice in planning for technology, integrating technology into the curriculum, aligning software with curriculum objectives, understanding of the elements and characteristics of long-range planning for the use of current and emerging technology; staff development; technical support; security, maintenance, and upgrading existing technology.

What Administrator Preparation Programs Should Prepare School Administrators to Know and Do

Technology is viewed by many, as a catalyst that can assist in transforming schools into highly productive organizations. Even though there is little definitive evidence linking computer technology to student achievement, a significant number of people believe that technology positively influences teaching and learning. School administrators are indispensable in the process of transforming schools through technology. This transformation requires school administrators who (a) understand technology terminology, (b) are knowledgeable about the power, features, and capabilities of technology, (c) understand technology's role in schools, (d) act as role models and encourage technology use, (e) can provide problem solving and technical assistance, (f) are change agents that facilitate technology's integration into teaching and learning. To fulfill these roles require extensive experiences and considerable expertise in the area of technology. Administrator preparation programs should provide aspiring school administrators with fundamental skills in each of the aforementioned areas.

Technology leadership entails both understanding technologies and how they can be applied to accomplishing tasks. We propose that administrator preparation programs should prepare aspiring school leaders through engagements that enable them to move beyond routine use of technology to a level of proficiency. At the basic level we agree with Kearsley (1990/1995), that school leaders should be able to explain basic computer terms and concepts, describe major hardware and software components, and understand the elements involved in evaluating and selecting hardware and software. We also suggest that school administrators be able to use technology to accomplish those things that teachers and students are expected to do. Beyond these, school leaders should be prepared to use technology to complete administrative tasks,

facilitate teachers' integration of technology into the curriculum, and understand how technology influences the teaching and learning environment to accomplish instructional objectives.

Administrator preparation programs should provide many engagements that allow students' to use technology in real world leadership situations. It is important for aspiring school administrators to have experiences with productivity tools such as word processors, databases, and spreadsheets. Beyond these, opportunities to use presentation software, access on-line databases for research purposes, and exchange information via electronic communication should be extensive. Although not an exhaustive listing, the following are some fundamental outcomes for individuals in administrator preparation programs and are representative of what aspiring school leaders should know and be able to:

1. Use a spreadsheet to prepare a school budget.
2. Communicate with school stakeholders using various technologies.
3. Access the districts database for numerical and demographic data.
4. Understand the legal and ethical issues related to technology licensing and usage.
5. Purchase up-to-date hardware and software.
6. Evaluate software for administrative use and instructional use.
7. Plan for the purchase, support, and security of acquired technology.
8. Understand how current technologies can be effectively integrated into teaching and learning.
9. Evaluate software for instructional use by teachers.
10. Assist teachers to integrate technology into classroom instruction.
11. Provide basic technical assistance.
12. Understand on-line filtering and its purpose in teaching and learning environment.
13. Facilitate teachers' professional development to use technology.
14. Use presentation software to enhance communication skills.
15. Research school improvement using the World Wide Web.
16. Select hardware that is configured with the most recent technology advances.
17. Use word processor, spreadsheet, database, and communications applications.
18. Desktop publishing.

Conclusion

The purpose for technology standards, and their application to school leaders, is the belief that administrators should possess a vision of what technology can accomplish in schools, be able to use technology for specific tasks and facilitate teachers and students' use of technology in the school environment. Competence in understanding the roles of technology in schools and being familiar with technology's power and capabilities requires experiences across the technological spectrum. Given this reality and what we know about administrator preparation programs, we believe that one course in technology at the masters level is insufficient to provide aspiring school leaders with the technology engagements necessary to prepare them to be technology leaders in schools. There is simply too much in the area of technology and its applications in schools to cover in a semester course. We suggest two courses specific to using technology at the master's level to adequately prepare school administrators to be instructional and technology leaders. Moreover, opportunities to use technology should be integrated in all courses that prepare aspiring administrators.

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Information Technology and the Transformation of Leadership Preparation Programs: A Response to Calls for Reform in Educational Practice.

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Abstract: This paper describes information technology usage in a radically different school leader preparation program. Ed.D students at Wichita State University are immersed in a variety of technologies from the first day of class. A collaborative, situated, problem-based learning approach to instruction requires acquisition of high levels of personal comfort and expertise with program technologies, sufficient to allow students to be efficient in their own studies, and to mentor others in various aspects of advanced information technology usage. Students incorporate technology in their roles as participant, collaborator, colleague, leader and follower in a variety of contexts: seminar, field study, content presentation, data manipulation, research reporting, group/individual comprehensive examinations, dissertation. Program graduates acquire, among other things, an understanding of the impact of information technology on their roles as visionary leaders of schools of the future and experience the transformational potential of technology on their own learning process.

Introduction

This paper focuses on the description of a doctoral program designed to prepare effective leaders for schools while emphasizing the transformational role of technology in the process. Three significant educational trends provide the background for this paper. The trends providing the foundation for this dramatic change in approach to the process of graduate education are represented by:

- increasing evidence of the change possible in the way that learning can occur in schools and in the workplace as a result of the presence of information technology;
- repeated calls for reform in educational and school based practices; and
- recognition that preparation programs for school leaders are in urgent need of reform.

In recognizing these trends, faculty from the College of Education at Wichita State University in Kansas, have demonstrated the positive impact of significant changes in philosophy and approach to the organization of graduate preparation programs for school leaders. Informal data gathered from current doctoral students and from graduates of the program indicate that the changes are positive and well supported. Responses from the field demonstrate that graduates of the program compete successfully for coveted leadership positions and are sought after by school districts in need of thoughtful, visionary and effective leaders.

Following the discussion of background information taken from the literature, the process and impact of integrating technology into the mainstream of daily practice within a radically different school leader preparation program will be described. The objectives of the program will be discussed in terms of technology-related practice. The belief that faculty must model technology integration (Blomeyer & Clemente 1997) will gain credibility through a description of faculty and student learning behavior. Further, a description of the technology infrastructure of the program, the smorgasbord of technology offerings available to students and incorporated into daily practice, and the impact of such practice on student behavior and learning will be presented. Throughout this paper, insights into a variety of program objectives and practices will be provided. These insights relate to:

- the philosophical underpinnings of the program;
- objectives of this graduate leadership preparation program including collaboration, teaming, use of authentic problems of practice, situated learning, reflective practice, cohort teams etc.;

• the smorgasbord of technology options forming the integrated technology infrastructure of the program: required laptop use, access to server, communication hubs, file-sharing, e-mail, projection devices, internet access, database usage, discussion lists, chat facilities, interactive technologies;
• the importance of group maintenance
• on-going technology training and
• the practical aspects related to the planning, administration, and management of technological and pedagogical innovations in graduate leadership programs.

Literature

In their book, The monster under the bed, Davis & Botkin (1994) claim that the knowledge business is transforming the way we learn (P.15). Their treatise on the place of knowledge-based enterprises of the future begins with the following story.

> Megan was five years old and worried about a monster that lived under her bed. She told a story about how the monster scared her, how she wanted it to go away, and how she solved the problem-now the monster lives under her brother's bed. She also drew pictures to accompany the story. They look like the kind displayed by parents on refrigerator doors. Only Megan drew these pictures on her computer and used the computer to record her telling of the tale ... Megan didn't stop there. She wanted to share her story, so she sent it by phone to an electronic bulletin board club, where other kids her age could watch and hear it.... Here was a five-year-old child who had accomplished all the major tasks of moviemaking. She was the star, wrote the screenplay, created the visuals, did the editing, was producer and director, and even did her own distribution. Her learning was integrated into the realities of her life. (P.14-15)

Elsewhere, a great debate ensues regarding the need for extensive reform in educational practice (Boyer 1985; Carnegie Task Force 1986; Holmes Group 1986; National Commission on Excellence in Education 1983; National Council for Accreditation of Teacher Education-NCATE 1997). In the United States, it is claimed that the "nation is committed to a course of fundamental change to improve ... educational Mojkowski 1991). Mojkowski suggests that the existing system of schooling does not adequately serve many children and is failing to keep pace with the revolutions in learning and work taking place in the rest of society. While this report goes to some length in describing the goals that should drive this massive restructuring process, there is recognition that while the goals themselves are "clear, comprehensive and oriented to results, ... they are beyond attainment unless sweeping changes are made in our education P.iii). Many of the changes endorsed by this report focus upon the belief that both technology and leadership are crucial components in the educational change process.

The process of integrating computer technology into classroom practice has been underway for twenty years. Some have reported that technologies appropriate for classroom practice have become an integral component of instructional processes (OTA, 1995). Others have suggested that the effective use of these same technologies enhances the performance of both teachers and learners (Jonassen 1996; Kauchak & Eggen 1998) and contributes to motivation levels apparent in technology based classrooms (Kauchak & Eggen 1998). In recognizing that such beliefs are not widespread, The Office of Technology Assessment (1985b) and NCATE (1997) have both stressed the need to incorporate instruction in technology into programs of teacher education in order to encourage more appropriate integration of technology use into school practices. Roden (1997) has indicated another area requiring attention if support for technology use in schools is to be optimized. He suggests that it would be inconceivable for school leaders to declare a lack of knowledge about mathematics or reading, but that many make a similar declaration about computers and the role of technology in classrooms. While it appears that most of these writers are describing what may be the beginnings of a revolution in learning occurring in schools based on the role of technology as change agent, it does seems strange that in the field of leadership preparation, discussions of reform have rarely focused upon the potential impact of technology on the thinking or the practice of school leaders.

In the field of leader preparation, undeniable conclusions have been reached regarding the need for reform. Since an agenda for the reform of school administrator preparation programs was first published by the National Policy Board for Educational Administration in 1989, others writers have agreed to the need for massive change in the preparation of school leaders (Leithwood, Begley & Cousins 1994; Murphy 1992). The fundamental underpinning of this reform movement was the firm belief that change in schools could not occur

without a change in the thinking of school leaders. Radically different schools needed radically different leaders. It followed, then, that the development and sustenance of these leaders would require a radically different conceptualization of pre-service and in-service education and training (Mojkowski 1991). Some writers have postulated that the predominance of traditional instructional paradigms in leader preparation programs agitated against the reform of such programs (Hallinger & Murphy 1991). Creighton and Yates (1999) claimed that administrators learnt skills on-site, in context and integrated with real-life applications. As though in summary, Mojkowski (1991) suggested that the process of leader preparation should integrate learning and work, emphasize action-oriented, problem solving approaches to training, focus on the development of teams and be comprehensive, coherent and continuous. In related studies conducted by The Office of Technology Assessment (1988; 1989; 1995), it was found that those administrators who were themselves, informed, comfortable and competent with technology use in their own jobs also became key players in leading and supporting the use of technology in schools.

A Radical Approach to Leader Preparation

Seven years after its inaugural intake of doctoral students, the leader preparation program at Wichita State University boasts a 100% completion rate for candidates completing the coursework component of the program. Further, students of this program have won national scholarships, have been recognized nationally as recipients of dissertation awards, and have been selected for coveted school and district leadership positions in Kansas school districts. The program itself has been described in detail elsewhere (Furtwengler & Furtwengler 1998; Furtwengler, Furtwengler, Hurst, Turk & Holcomb 1996) and will be featured in an upcoming issue of the Journal of Critical Inquiry into Curriculum and Instruction which publishes exemplary research products of graduate students in professional study. Notwithstanding this national and international exposure, the unique features of this clinically oriented, field-based, applied inquiry program in educational administration are worthy of further mention. The program distinguishes itself from traditional administrator preparation programs through a design that emphasizes: (a) rigorous admission requirements and low enrollment, (b) release time from district employment for prospective students, (c) integration and contextualization of the curriculum, (d) incorporation of field-based research studies, (e) a collaborative, team-based approach to teaching and faculty load distribution, and (f) a cohort-based student support structure. These program design features correspond to those calls for specific reform measures in preparation programs for school administrators outlined above.

In addition, this program design is supported by a confirmed philosophical belief related to the process of teaching and learning within the program. Based upon a theoretical framework derived from problem-based learning (PBL) (Boud 1985; Boud & Feletti 1991; Bridges 1992), this program functions with the belief that authentic problems of practice, explored in collaborative team settings lead to learner-directed and setting-enhanced learning. Faculty attached to this program believe that these problem situations raise the important concepts and principles associated with the content domain and that they are perceived by graduate students as real problems of practice (Savery & Duffy 1995). In the dynamic and situated learning environment that is representative of daily life within this leader preparation program, meta-cognitive scaffolding is provided by faculty and peers (Savery & Duffy 1995). The underlying propositions of constructivism (Savery & Duffy 1995), including the ideas of cognitive dissonance and negotiation of meaning, are core program components. Studies of student thinking during the initial problem analysis phase of PBL (De Grave, Boshuizen, & Schmidt 1996) corroborate the belief, clearly in evidence within this program, that exposure to different ideas in a group leads to conceptual change and that group interactions serve to encourage activation and elaboration of existing knowledge and integration of alternative views. Further, this program epitomizes the growing trend recognized by Heath (1997) for models of education which accommodate a constructivist view of learning incorporating the use of emerging technologies (Hannafin & Land 1997).

Using Technology in the Transformation of a Leadership Preparation Program

In this leader preparation program, two applications of technology can be distinguished. The first is that used as part of program functioning and required for daily use and program effectiveness. The second relates to technology usage that is experimental and evolutionary. This second type of usage refers to the incorporation of technologies new to the program, and new information technology applications designed to meet program needs and expectations for growth and expansion.

Program Expectations for Technology Use

The pre-dissertation stage of this doctoral program requires students to attend one full day of class time per week over a two year period. Class time is divided between seminar and field study time. During seminar, students meet in cohort groups along with two or three professors and explore an extensive array of topics as presented by an exhaustive reading list of books on the cutting edge of leadership thought. Field study time comprises the research-based exploration of authentic, contextualized problems derived from discussion with school board members, and district administrators from local school districts. Site selection for research studies are contingent upon the acceptance of a school district administrator as a student into the doctoral program.

Class-based interactions begin with setting up a small classroom in a conference room format with a communications hub sufficient to connect all students and professors to a department server via ethernet connections. These connections provide further access to the internet and associated data-bases, libraries and search facilities. A data projector is connected to a lap top computer, the purchase of which is a condition of acceptance into the program. An elongated power strip provides a power source for up to six students and three professors. Unrestricted access to a telephone, a fax machine, and a photocopier is nearby. Both color and black ink printers are accessible via the local network. Students and professors each have personal email addresses (another program expectation) and are provided passwords for remote access to the departmental server. When completed, this daily ritual has converted a most un-noteworthy small conference room into a high-powered research and analysis laboratory.

Software requirements mirror hardware configurations and program objectives. An integrated office productivity program incorporating word processing, data-base, spreadsheet and projection software is mandatory. A bibliographic database, and an appropriate internet browser are also required. Access to other software provided by the department includes a statistical analysis package, desktop publishing software and a relational data-base package used in the analysis of qualitative data. These packages are made available to students through site licenses maintained by faculty. Further software is provided as needed and available to support innovative and flexible additions to program requirements.

Training in the use of these hardware and software configurations begins with a summer program designed to launch doctoral study for each new cohort. Comprising six students, the new cohort enrolls in a course focusing upon technology and academic writing. The existing cohort act as mentors to their neophyte colleagues as students and professors explore hardware and software capabilities within the context of problems typical of program requirements. Learning about technology in this context is ongoing and is rarely completed as new skills, and new applications, are discovered and levels of expertise increase.

Daily information technology activity for all students and professors includes the use of email, internet searching, file sharing, program organization, project management, bibliographic referencing, statistical analyses, qualitative data analyses and functional use of all required software application programs. Familiarity with printers, projectors and interactive communications hardware is also required and usually occurs, without trauma, well before the end of the two-year course of study. The level of interactivity via email, file sharing and surfing for the sake of research continues between class sessions as semester projects and planning for seminar discussions are shared. Periodically the need for applying levels of interactivity new to this doctoral program arise and provide students and professors with an opportunity to experiment with available technology and program objectives.

Experimental Applications of Technology

Apart from the normal levels of required interactivity described above, occasional opportunities for expanding the level of technology integration in this innovative program arise. In the normal course of events,

all students in this program drive to the university to attend a full day class once a week. This represents a significant commitment, as driving time can, for some, exceed nine hours: four and one half hours of driving on either side of a full day in class. These students are still required to function effectively the following day in their role as district administrators. During the last twelve months the variable of distance has provided an opportunity to experiment with interactive television in an attempt to replicate and maintain the intensity of collaborative, team-based, group interaction across significant distances.

On several occasions, arrangements were made for some students to remain in their western Kansas locations while the rest of the class met on campus at the university in south-central Kansas. Two-way interactive television links were established between both locations. The organization for the day remained as normal as possible, with the exception of a change of location to a conference room having interactive television capability. This interactive room was rearranged to replicate the physical layout described above, along with all standard technological capabilities required by the doctoral program. Planned group research and writing activities, seminar activities, and incidental personal meetings, interactions etc. continued as normal throughout the day. An evaluation of the activity was conducted. Professors, students and technical personnel were asked to complete a questionnaire on the effectiveness of the interactive activity. With the exception of some instances of sound degradation periodically throughout the day at the remote location, no other technical difficulties were experienced. Students at the remote location expressed concern that they could not go to lunch with their colleagues although they were appreciative of the reduction of driving time. All evaluations strongly supported the use of this form of interactivity as a viable program alternative and confirmed the belief that the essence of group collaboration forming the basis of this doctoral program was capable of being maintained across distance.

On another occasion prior to this interactive television activity, a discussion list designed to supplement interaction based around seminar discussions was activated with the assistance of the university's computer services division. A professor assumed the responsibility for maintaining the list. Activity continued throughout the semester and student reaction indicated that interactions provided through this medium were of value. This activity was not maintained, however. Plans for the future incorporation of discussion lists, chat facilities and web site usage into the smorgasbord of technology options forming the integrated technology infrastructure of this program are underway.

Conclusions

Banks, Stacey, and Omoregie (1997) claim that technology training for teachers and administrators is the key to successful implementation of technology in the classroom. In a research study analyzing the process of technology integration into K-12 curricula, Mahmood and Hirt (1992) conclude that a number of variables impact plans for integrating technology, but none so much as strong support from school and district administrators. In describing goals necessary for creating a technology-effective, and integrated learning environment, McPherson (1995) focuses upon the crucial role of school leaders in the process of information technology integration. She suggests the need to create dynamic leadership and organizational support, using the full range of technologies to promote school reform, meet national and state educational goals, and assure quality education for every student. These and other writers have recognized that a key barrier to the use of technology in schools is the lack of administrative support (Maurer & Davidson 1998; OTA 1988, 1989, 1995; Rodin 1997). By indicating that schools with effective technology curricula also have strong administrative leadership supporting and sustaining effective technology programs, these writers infer the need for technology-based reform in administrator preparation programs. Suggestions that administrators need to know how technology can restructure the teaching learning process and keep an active focus on the real purpose of the educational system are commonplace. Exposing administrators, who are likely to assume the responsibility of visionary leadership in schools of the future, to the positive changes brought about by technology is an uncommon practice. Modeling the technology reform process in education as a component of leader preparation programs is one way of ensuring a balance between technological ideals and practice.

Over the past seven years, and through the combined efforts of all faculty involved during that period, the leader preparation program at Wichita State University has met the calls for technological and program reform. This radically different program has managed the difficult transition from a highly traditional and predominantly decontextualized program, to an environment where situated, problem-based, and collaborative learning predominates. This answer to the calls for reform has been formulated through:

- the inclusion of required technology components in program application procedures (purchase of hardware and software as conditions of enrolment);
- the incorporation of contextualized and integrated curriculum and instruction in technology usage;
- a student cohort support system and mentoring roles required as rites of passage through the program;
- the construction of peer teams and adoption of group and individual responsibility for learning; and
- immediate and continual immersion in the use of interactive, information technologies in exploring authentic problems of professional practice.

This program has provided school leaders with the tools to think about technology in vastly different ways and the experience to do something about it.

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Graduate Technology Coursework in a Framework of Professional Leadership

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Abstract: Responding to the call for change in higher education leadership preparation programs, the Department of Human Services and Professional Leadership revised and further developed an existing model guiding the college in which the department resides. The Caring Intellectual Leader Model, is designed to focus on problem-based learning which incorporates the infusion of technology throughout all levels of knowledge acquisition and assessment: formal, descriptive, prescriptive and praxiological.

Introduction

American education has been at the forefront of public policy analysis since the early 1970's when influential groups began the clamorous call for reform. With this call came a spate of critical documents which demanded substantive change in the preparation of educators and provided data indicating that current offerings are not adequately meeting the needs of the constituents, who seek greater input into policy formation and decision making. We hear continually of the need for systemic change (Feigenbaum, 1993; Murphy, 1991; Gordon, 1992; Senge, 1994) and de-focusing on specific roles and issues. This focus on the "system" comes in the wake of unrelenting teacher and administrator condemnations following the national report, A Nation At Risk (National Commission on Excellence in Education, 1983). Indeed,

the problem is compounded by continual strident accusation, and the failure to address the root cause of school problems.

Johnson (1992) asserts that the new mission of education will require significant changes in preparation of educational leaders in order to meet the needs of the technologically driven societal and schooling domains. In support of this notion, Hallinger and Bridges (1999) state that most leadership programs focus almost exclusively on the cognitive dimension and rarely address the level of practice in a meaningful manner. In order to accomplish the task of preparing education leaders for problem-based, authentic learning, it is incumbent upon higher education and schools to shift paradigms (Wheatley,1995) and reconceptualize the future needs of schools and educators in a high technology Information Age which calls for increased empowerment of staff. Johnson contends (p. 100) that: "The need is no longer simply to induce conformity to established practice among future leaders but rather to develop a critical analytic approach to the production of new practices". Zukav (1979) depicted this need well in his classic book The Dancing, when he stated that restructuring must cause us to "slip the bonds of the known to venture far into the unexplored territory which lies beyond the barrier of the obvious" (p.82).

Changing paradigms is difficult for individuals; it is more so for institutions (Senge,1990). In general, the literature (Fullan, 1993) suggests that higher education institutions have not responded to the pressures to substantially alter their offerings or the method of instruction in educational leadership programs. Murphy (1991) conducted a study examining the effect of the reform movement on leader preparation programs and determined that only slight to moderate changes were being made in compliance with reform admonitions and recommendations. He attributed this to a lack of motivation among college preparation programs to change.

Numerous experts note the dearth of transformative preparation programs (Leithwood, 1992;Naisbitt, J., & Aburdene, P., 1986; Lampe, S. et al, 1992) and the reluctance of higher education to respond to the pressures to substantially alter their offerings or redefine appropriate pedagogy. Although the reform movement has received a great deal of attention by the popular press, it has not had as significant an effect on higher education preparation programs across the nation (McCarthy, 1988). In 1991, Joseph Murphy conducted a survey of 74 chairpersons of the University Council of Educational Administration (UCEA) and non-UCEA programs. Findings of this study indicate that the overall picture is one of slight to moderate change in response to reform initiatives, including teacher empowerment. It is very easy to discuss the empowered workplace; it is entirely another issue to deliver on this promise. One does not change long-held ideas about the organization and the power base by desire. Senge (1990) advises that substantive cognitive changes must occur before we change our behavior and beliefs. He states that "...new insights fail to get put into practice because they conflict with deeply held internal images of how the world works, images that limit us to familiar and conventional ways of thinking and acting." If leaders are to be adequately prepared for the future, higher education programs must heed the call for reform that is in accord with the needs of the times.

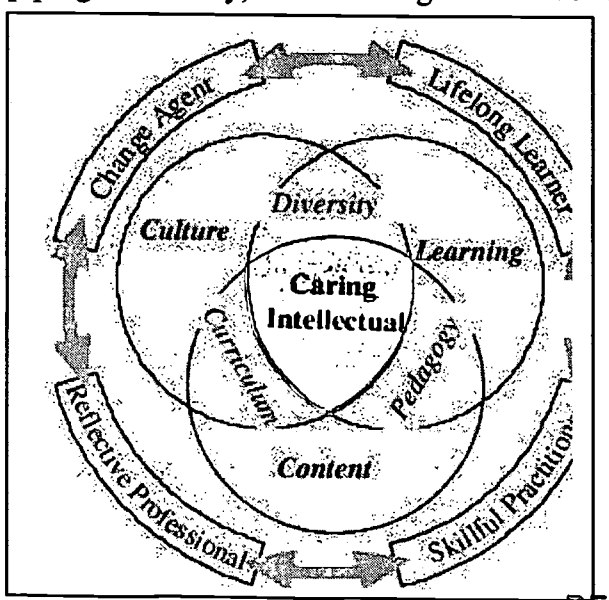
The single area where most higher education change efforts converge is the

augmentation of curricular efforts to address leadership issues which are consonant with reform exhortations advocating a focus aimed at developing reflective practice (Norris & Lebsack, 1992) in a problem-based learning environment characterized by the increased focus on praxis in instruction and assessment. The literature defines four levels of knowledge which must be incorporated in both instruction and assessment: formal, descriptive, prescriptive and praxiological) Praxiology, according to Mozilla (1999) is that domain of knowledge which focuses on the practice of leadership. Mozilla has developed a computer-based model (The Complete Teacher, 1999) for teaching and assessment of each of these areas. This model will be incorporated into the Wisconsin Leadership program being discussed below.

Caring Intellectual Leadership Model

Leading educators and researchers suggest that if substantive curricular renewal and transformation in higher education is to occur, it must be at the programmatic level (Johnston, 1992). Understanding this recommendation, the educational leadership program faculty has focused on revision at this level. Norris and Lebsack (1992), in reporting findings from a three year pilot designed to examine different approaches to the preparation of school leaders, identify necessary components which include: a) programs must have personal meaning and relevancy, b) cohort and mentor experiences are important in assisting the scholars' bonding, and c) curriculum requirements and teaching must reflect the faculty's commitment to the praxis structure. The program faculty recognized that the change from traditional leadership course work and pedagogy to one characterized by problem-based learning with technology infusion is not merely curricular nor structural, but endemic in nature. The entire paradigm must be redesigned to meet the needs of the future.

In response to the literature, research and the cumulative experience of the Educational Leadership program faculty, the following model was adopted.



The Master of Science program in Educational Leadership resides within the Department of Human Services and Professional Leadership Education (HSPL), College of Education and Human Services at the University of Wisconsin Oshkosh,. HSPL addressed this challenge by the adoption of an empowerment model that simultaneously promotes personal and professional

growth. The heart of the model identifies the goal outcome, a Caring Intellectual, and places technology integration coursework in a unique position. Technology is the support system whereby the curriculum, personal aspects and practice all converge. Technology facilitates problem-based learning and a Constructivist approach to curriculum, which enables the Educational Leadership program to foster empowerment and a sense of self -efficacy in future leaders. The underlying philosophy guiding this model identifies the outcome component as a "Caring Intellectual" and includes the following attributes; lifelong learner, reflective practitioner, skillful professional and agent of positive change. Examination of the model includes diversity, content, culture, pedagogy, learning and curriculum.

The focal concern that was addressed by the Department of HSPL was the identification of the major issues that have the capacity to effect the terminal goal of increased student performance. Fundamental to the assessment of the Educational Leadership program was the intensive analysis of all possible elements that might contribute to this primary goal. The context is extremely enigmatic and many determinants and theories would underpin the response. Included among these might be Constructivism, the Socratic Dialogue, Case Study analysis and Problem-Based Learning. The literature and experience suggested the need for a clearly defined mission statement, program goals and assessment methods be in place for programmatic clarity and definition.

Central to the department mission and philosophy is the belief that all educators - teachers and administrators - must come to the same table to dialogue, share and envision educational reform strategies in problem situations. Toward this end, the department offers two strands or emphasis areas in technology. One is designed for teachers who envision that they will use technology as a tool within their curriculum while the other is designed for educators who wish to develop more technical expertise that could lead to certification as a district technology director. A central core of 12 hours of technology integration courses is required for both emphasis areas in an effort to insure that district administrators are sensitive to the needs of the classroom teacher and the potential of technology as a tool for curriculum delivery and assessments.

The two technology emphasis areas are detailed below. Notice that both share a common core to insure dialogue and awareness of the needs of the classroom teacher in successfully integrating curriculum and technology.

Education Leadership with emphasis in Integrating Curriculum and Technology (MS Educational Leadership, 36 credits)	**Educational Administration and District Technology Coordinator** (MS Educational Leadership, 42 credits)
Required coursework: • Leadership for Curriculum Development • Supervision of Instruction	*Required coursework:* • Leadership for Curriculum Development • Supervision of Instruction

• Org. & Admin. of Educational Systems • Multicultural Education for Leaders • Integrating Technology into Classroom • Instructional Strategies • Multimedia Design & Production I • Multimedia Design & Production II	• Org. & Admin. of Educational Systems • Multicultural Education for Leaders • Integrating Technology into Classroom • Instructional Strategies • Multimedia Design & Production I • Multimedia Design & Production II • Funding/Managing Educational Technology • Networking
Electives (select 2): • Classroom Computer Applications • Internet as an Instructional Tool • Educational Leadership • Legal Aspects in Education • Leadership for Staff Development • Funding/Managing Educational Technology • Networking	*Electives (select 2):* • Classroom Computer Applications • Internet as an Instructional Tool • Educational Leadership • Legal Aspects in Education • Leadership for Staff Development
Select one: • Seminar in Educational Leadership • Thesis	*Select one:* • Seminar in Educational Leadership • Practicum in Admin & Supervision

Conclusion

In order to provide appropriate preparation of administrators and teachers, educational leaders, the faculty in the Department of Human Services and Professional Leadership at the University of Wisconsin Oshkosh researched many models and pedagogies. The Caring Intellectual model was adopted and modified to clearly identify problem-based learning characterized by technology infusion at all levels of instruction and assessment.

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Professional Development for Systemic Change: A Strategic Approach to Scaling Educational Reform through Professional Development Programs.

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Abstract: This paper discusses our approaches, both in theory and practice, to the enactment of systemic reform as a part of the Center for Learning Technologies in Urban Schools (LeTUS). The University of Michigan and Detroit Public Schools have partnered in this Center to develop and implement a systemic educational reform program to help middle school science educators understand and enact some basic ideas and concepts of inquiry-based science focused on the use of various technologies to assist in the learning process. Presented here are the challenges of implementing a professional development program geared toward systemic reform, along with details about the enactment and scaling of this multi-faceted professional development program. The paper also suggests a variety of considerations regarding the scaling of such programs.

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Introduction

Educational reform has generally taken one of two paths in finding a way to change classroom practices, whether addressing implementation of technology use by students and teachers, or by focusing on shifts in pedagogical approaches and content knowledge. Very often, especially with respect to the infusion of technologies such as computers in classrooms, true reform has come from the grass roots; the teachers themselves. Innovative practices which involve processes of student inquiry for individualized construction of knowledge while utilizing technology were borne out of an individual teacher's ideas, and

enacted within their own classroom. They were the early "technology superstars" in the schools, making efficient and effective use of the new computer technologies to allow students to demonstrate advanced learning and thinking in a variety of ways. Occasionally, others would hear of their advancements and attempt to recreate or join their efforts. But, for the most part, these innovations were contained within a few select classrooms.

Other innovative reform efforts might take an altogether different path for their genesis. Many of the recent school and site-based reform efforts are administrative directives, the attempts of administrative leadership within the school or academic community to change educational practice by creating practices which direct individual teachers as to what to do within their classrooms to improve student learning. Sometimes, it takes the form of a new software program, a different textbook, or a set of standards and outcomes for which success (and motivation) will be determined by some form of summative assessment. While these "top-down" forms of reform efforts may have greater "volume" of impact, they too may lose effectiveness by reinterpretation by teachers, bureaucratizing of reform efforts, lack of proper support, and simple apathy of teachers who are uncomfortable with a "directive" format of change for their classrooms.

Systemic reform is a complex notion, which requires a new approach. For teachers to truly be involved in the efforts and understand both the content and pedagogy issues of the reform effort, they must be directly involved in the reform process. Yet, for the reform effort to occur throughout an entire school system, especially a large urban school system, having all teachers involved in the development of new curricula, adaptation of learning technologies, and change in approach and method of instruction would become chaotic, and would likely throw the system out of control. So, a dynamic tension is created between the two approaches. Administrative decisions must be made to properly support and motivate teachers to become involved, and teachers must take the initiative to become involved in a program encouraging their support of and enactment of innovative curricula and pedagogy, becoming collaborators in this process.

Context and Theoretical Framework

We have been working in collaboration with an urban school district to reform science education to be inquiry-oriented and make use of pervasive educational technology by creating professional development opportunities that will address the needs of a diverse population of teachers. Our experience comes from our work in the Detroit Urban Systemic Initiative, a successful reform-minded program focusing on the improvement of science education in urban middle schools. As a part of the Center for Learning Technologies in Urban Schools (LeTUS), the University of Michigan and Detroit Public Schools have partnered to develop and implement a systemic educational reform program to help middle school science educators understand and enact some basic ideas and concepts of constructivist educational practice.

There are challenges unique to urban environments, including high teacher mobility rates, spotty content-area and technology specific preparation for teachers (with many teachers teaching out of their specialization), a lack of a substantial and "teacher friendly" technology base in many schools and classrooms, and high poverty among students. These challenges (and others) must be addressed by professional development if reform efforts are to become successful for individual teachers and students, scaleable to the needs of the whole school and district, and sustainable in both individual classrooms and the system as a whole. The reform effort is systemic in nature, focusing on changing the way science is taught (and learned) throughout the entire district of 180,000 students, as well as other districts interested in the approach.

The professional development framework underlying our work is rooted in a larger theoretical frame called CERA (Marx, Blumenfeld, Krajcik & Soloway, 1997a; Marx et al., 1997b), which stands for Collaborative construction of understanding; Enactment of new practices in classrooms; Reflection on practice; and Adaptation of materials and practices. CERA provides the general backdrop for our collaboration with the school district and with teachers in all activities, including professional development.

The challenge of scalability and sustainability of a systemic reform program adds layers of complexity to the professional development program. This development effort calls for massive upscaling over a

relatively short period of time and requires constant modification of the model for implementation of professional development programs. For instance, providing individual classroom support for five teachers in two schools is relatively easy. Providing similar support for fifty teachers in twenty schools a short while later requires a massive growth in resources, if the same model is applied. This would be difficult for any such program, but, when combined with the underlying focus on individual student inquiry modeled within development efforts, the task becomes daunting; requiring constant change in the strategies and method of the development program. The infusion of computer-based technologies complicates this further, as the nature of the technology changes ever so rapidly. Thus, the development program itself has varied significantly from its inception, and will continue to do so as the scope of the program grows throughout the school system. As a result, a dynamic for sustainable growth is implemented within the development program, calling upon the knowledge and experiences of teachers involved early in the program to take on greater leadership responsibilities to encourage and promote growth as the program proceeds. In addition, the nature of the individual elements of professional development change, focusing on more global, pedagogical concerns as teachers add experiences that allow for reflective understanding of these concepts.

Elements of the Professional Development Program

Professional development for systemic educational reform (focusing on understanding and enactment of inquiry-based science curricula with embedded technology use) within a massive urban school district requires a variety of elements in order to accommodate the diverse needs of the teachers within the system. The primary element of this professional development program is the use of educative curricula, which are intended to provide opportunities for student learning through inquiry and technology use while providing teachers with activities and other constructs to enhance their understanding of content, pedagogy, and technology through active reflection. Other elements include more traditional development activities such as summer and weekend workshops (with non-traditional, model based activities during the workshops) with other, less-traditional events such as in-class support by curricular, pedagogical and technological experts; intradistrict, teacher-led, after-school study groups; and network-based resources designed to supplement activities and strategies provided through other support methods. This allows for individual teachers to center on their own goals and strategies within the classroom, while being a part of a massive development program.

As mentioned earlier, all of these activities are centered upon the use of an "educative" curriculum unit, designed to provide opportunities for enactment of the desired practices within a content-focused framework. These curriculum units provide a guided set of activities to engage students in the learning of science content focusing on a contextualized driving question. They are designed to remove the teacher from the role of "keeper and communicator of knowledge" to a facilitator of student learning through an inquiry and investigation process, which utilizes a variety of technological tools to help students understand relationships of the content concepts. They provide a number of opportunities for teachers to personally reflect upon the enactment of the curriculum, and engaging questions to help redirect the personal pedagogy of the teacher. They also provide the context for the professional development program to help teachers examine different practices and their impact on student learning.

The summer workshop functions as the kickoff activity for teachers involved in the program, in that it provides the orientation to the program and the underlying pedagogical concepts promoted by the Center. Teachers are introduced to inquiry-based, technology centered curricula by enacting their own investigation of the concepts inherent in the curricula they would be teaching in the following academic year. While participating in the inquiry projects, teachers are constantly encouraged to reflect upon their activities from a learner's perspective, and develop and share strategies for the teaching of these concepts during the school year. Teachers also participate in other work sessions, focusing on understanding the underlying content and pedagogy of the educative curricula, forming a community with other colleagues in the program, and developing a strategic plan for local enactment of the curricula.

Saturday workshops held throughout the school year provide another element of the professional development program, similar in nature to the summer workshop, but held periodically through the school

year to provide a construct for teachers to reflect on practice during the enactment of the educative curricula. These workshops group teachers and administrators working with four distinct curricula together in the mornings to discuss general concepts and strategies of constructivist pedagogy focusing on technology integration and inquiry based science. In the afternoons, teachers collect in smaller groups to discuss issues relevant to the implementation of their particular curricula, which are divided by grade level and district standards.

Another very important aspect of this program is the use of in-class support personnel who assist the teachers with the enactment of the curriculum, and encourage reflection on practice. These individuals are prepared by training and immersion in the curricula and with the technological tools. All support personnel are experienced teachers with an understanding of the underlying pedagogical concepts of the program. These individuals participate in four fundamental support activities; cognitive/pedagogical understanding support, in-class teaching assistance, technology related assistance, and logistical or documentation activities (See Table 1). Regular evaluation of support personnel takes place with teachers at the Saturday workshops, in that teachers complete feedback and evaluation forms to note needs and concerns regarding in-class support. Support members also meet regularly to share ideas and concerns brought back from their experiences in the classroom to develop strategies for working with varying teacher needs. Their feedback is crucial in the development of other professional development programs, such as the Saturday workshops, the development of the educative curricula, and development of on-line resources for teachers.

Cognitive or High Level Support	Pedagogical Support	• Reminding teachers about techniques, or prompting during enactment when needed. • Discussion of use of certain methods or past classroom events as illustrations of methods and their impact.
	Organizational Support	• Assisting in decision making regarding organization and logistics. • Helping teachers determine how to acquire materials needed. • Reviewing curriculum materials to facilitate enactment.
	Content Tutoring	• Teaching the teacher specific content (outside of class time)
	Reflection Guide	• Helping teachers to reflect about their classroom practice outside of class time (usually following an observation of the class)
	Moral Support	• Listening to other teacher issues, both project related and other.
	Classroom Management	• Assisting with classroom management, such as chaperoning a field trip or helping keep students on task during group activities.
In Classroom Teaching Related Activities	Model Teaching	• Teaching a class in the teacher's presence in order to convey a clear image of how a particular activity might be enacted.
	Collaborative Teaching	• Team teaching a class session (occasionally as a follow up to model teaching) to assist the teacher with enactment.
	Working with Students	• Asking students questions regarding the content or process. • Responding to students' questions • Supporting lab enactment or group interactions by helping keep students properly engaged in the activities of the curricula
	Point of Reference	• Being available in the classroom to add a comment or provide more explicit content information or ideas, typically to complement the teachers' own understanding of the content.
Technology Related Support Activities	Technology Set Up	• Helping make sure that computers and software are in working order and ready to be used for a particular activity.
	Technology Tutoring	• Teaching teachers how to use the technology (outside class time)
	Technology Support	• Helping out during enactment, either in a cognitive support role or troubleshooting.
Logistical or Data Collection Activities	Messenger/Materials Provider	• Conveying information or delivering materials to or from the teacher to curriculum or professional development specialists.
	Observation	• Watching and taking notes on the curriculum enactment • Noting teachers' adaptations regarding the curriculum enactment.
	Video Documentation	• Recording a particular class session for review by the teacher or curriculum/professional development specialists.

Table 1. In-Class Support Roles of Professional Development Personnel.

In creating such a program for teacher development, we have to acknowledge and utilize the experiences and strengths of the educators involved throughout the process. The efforts of working with a small group of teachers to pilot the educative curriculum and accompanying technological tools cannot simply be replicated with a large group of teachers. Rather, as the curricula was developed an evaluated and refined, other teachers were recruited to become involved in the program. Educators inducted into the process from the beginning became more familiar with the tools, the content, and the accompanying pedagogy, and moved from requiring support to providing it for others. Teacher support constructs evolve, moving from individualized in-class support to collegial sharing of concerns and ideas, all fostered by efforts to encourage individual teachers' reflection upon their practice and student learning. Web-based supplementation of support is now provided, to allow the variety of teachers involved in working with these curricula, technologies, and pedagogical issues other methods of communication, collaboration, and reflection. As the number of teachers involved in the reform effort increases, so evolve the professional development activities in order to make use of the teachers' experiences and encourage sustainability within the program.

Findings and Challenges

While findings of these curriculum units are not discussed here, informal observation reveals the impact, both positive and negative upon teacher practice. Successful enactment of the curricula allows the teachers to become familiar with the content, pedagogy, and technological tools encouraged in the program. Teachers use the materials to provide learning opportunities for students which also allow the teachers to gain experience in the enactment of an inquiry based pedagogy, and in the infusion of technological tools designed to aid in student cognition regarding the concepts and relationships of the content. The reflective questions and commentary within the written curriculum documents, when teamed with other forms of support, help the teacher understand the educational impacts of their practices on students, and focus on the changes in student learning, motivation, and content focus encouraged by the curricula.

Difficulties in the enactment come, for the most part, from challenges regarding organization, time management, and a diverse and dynamic student population. These challenges have forced some teachers to cut short elements of the curricula, as administrative and personal pressure encourages teachers to move on to more familiar practices. Such enactment seems to encourage the use of the pedagogy and technologies as interspersed "activities" and "techniques" rather than an underlying change in philosophy of teaching and learning to a more constructivist approach. Such challenges highlight the need for more comprehensive integration of all of the forms of support for teachers, as well as additional needs for addressing administrative buy-in and professional development for individuals in decision-making positions.

But, the challenges for enactment do not stop there. A number of other issues face educators in a variety of ways regarding the use of the curricula and adoption of these goals and practices. Some of the teachers struggle with content knowledge and its accompanying pedagogy. Over one third of the science teachers involved in the program have no strong science background, and so part of the professional development must address basic scientific concepts for these individuals. Many teachers who feel less proficient with the content often find themselves so tied to the activities listed in the curricula that they limit the adaptation necessary to gear the curricula to their students' specific needs and abilities. Others let their insecurities get the better of them, straying away from the design and focus of the curricula.

Perhaps the greatest barrier to enactment does not exist within the teacher, but rather within the school. Implementation of a curricula with pervasive technology use requires knowledge of and access to the technological tools utilized within the curricula. Problems with these technologies abound within the program. Some teachers have little or no access to facilities with appropriate technology within their school, either because the school as a whole is limited in these tools (though the Center made this an inherent element in the selection of schools to be involved in the program), or because these tools are used for other educational programs. The software for these curricula are specialized and require a variety of

specialized hardware and software requirements, which are often limited within some schools. And, while the software has been tested in a variety of circumstances, the tools created for this program are specialized tools for these curricula, and are continuously under development. Analysis of all of these barriers will take place in a variety of stages, including analysis of videotaped class sessions, field note forms from teachers and support personnel alike, notes from administrative meetings, and interviews and surveys of teachers and students involved in the project.

A Final Challenge: Scaling Up

As mentioned earlier, one of the critical and difficult elements of systemic educational reform is attempting such reform on such a large scale. Changing the practices of one teacher or school is challenging enough; changing an entire system, especially in a district with 180,000 students and 243 schools is an entirely different matter. One of the underlying goals of this program is to go beyond working with a small number of teachers in the implementation of these practices. In addition to all of the other challenges of working with a diverse population of teachers and the different requirements for professional development of all of these individuals, they professional development efforts must be able to scale appropriately while maintaining their relative effectiveness.

When this program began three years ago, it was piloted with one curriculum in two schools. Last year, 20 teachers in ten schools became involved in the program. This past summer, attendance at the summer workshop numbered over 45 from 18 different schools, and additional teachers have joined in the Saturday workshops ever since. This kind of growth is not only expected of such a program, but promoted. Teachers of science at the schools involved in Center activities who have not been involved in the curriculum enactment or professional development are encouraged to join the group.

TLI: Recreating University Programs to Meet School District Needs

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Abstract: This paper describes a constructivist-based initiative to recreate a university's college of education graduate programs to focus on the concept of *Teachers as Learners and Leaders*. This initiative caused the university and school district partners to examine the structure of programs for experienced teachers and their relationships to real-life needs. The Technology Leadership Institute (TLI) is one of the cohort groups collaboratively developed with school district partners to meet needs for increased expertise and leadership in teaching and learning with technology at classroom, school and district levels. Documents and products of the TLI may be accessed at http://tli.jefferson.k12.ky.us.

Introduction

The Technology Leadership Institute (TLI) is one collaboratively-implemented answer to two questions: 1) How can a large school district develop and maintain building-level and district-level support for technology adoption? 2) How can a school of education leverage its limited resources and restructure its offerings to improve experienced teacher education programs?

Like many institutions of higher learning, this university's programs and faculty enjoy a level of stability that inhibits new initiatives and change. The emergence of use of technology for instructional support and delivery has not gone unnoticed but has been slow to impact the way many professors teach their courses and the courses they teach. At the same time, the school district has implemented technology for instruction for over 15 years, in a state where technology is a priority of school reform that is accompanied by state funding. With a ratio of one computer per six students and internet connections in every classroom, the district implements a technology integration curriculum and a yearly assessment with parallel professional development opportunities. The state requires each teacher to complete a masters degree and districts provide salary incentives for post-masters work.

With 150 schools serving primary through grade 12, and a similar type of staff stability, the district's need for new and experienced teachers who can use technology is critical. The development of school-level technology leadership is essential. Collaboration between institutions around the theme of technology leadership is the challenge.

As in many change projects, personal relationships, the spark of an idea and the opportunity for some reward collided to create an opportunity. The TLI attracted a cohort of 15 teachers and librarians the first year and another 45 the second year, indicating a large unmet need. University and school district technology experts collaborated to develop the courses, house the classes, identify the instructors, manage the enrollments and evaluate the results. The TLI is still a work in progress, and the partners are endeavoring to solve problems in each institution to fine-tune instruction and products, to streamline program and course approval, to fix advising and registration problems. This paper describes the design of the TLI and the design of the School of Education's initiative which fostered the TLI and other innovative projects.

Recreating Colleges of Education Initiative

The design of the TLI is based upon a school of education model that has, so far, fostered development of six teacher cohorts whose themes include writing, social studies, and the principalship. These themes have grown from identified needs of the state and the school district and of the teachers, who collaborate with faculty in development of the programs.

The University of Louisville is one of eight southern colleges and universities chosen to participatein the BellSouth Foundation's Recreating Colleges of Teacher Education Initiative. As part of the initiative, the school of education is focusing on making the concept of *Teachers as Learners and Leaders* a pervasive theme of its graduate-level teacher education programs, a theme already embraced in its basic teacher preparation programs. Implementing the initiative is causing a major rethinking of how offerings for experienced teachers might be restructured, particularly considering the realities of emerging new knowledge, current program evaluations and the changing marketplace.

The beliefs inherent in the design of the initiative are:

1. Teachers are leaders and inventors of quality work for students.
2. Learning occurs when students construct knowledge and make meaning based on their experiences, beliefs and values.
3. Teachers must be committed to principles of equity and social justice and provide evidence of these principles in their practice.
4. The work of teachers is to ensure learning for all students by designing instruction that is engaging, of high quality, encourages students to persist, and honors diversity in learning styles.
5. Schools are places where both the students and adults are engaged in continuous learning and where they acquire the skills to become lifelong learners.
6. Technology will facilitate student and adult learning in new directions, which we have not even imagined.

Technology Leadership Institute Cohort

Purpose. The Jefferson County Public School District (JCPS) and the University of Louisville School of Education are collaborating to offer a 30 credit-hour program for Instructional Technology Leaders, based upon technology standards developed by the International Society of Technology in Education (ISTE). The purpose of this program is to increase technology expertise of educators and to foster leadership in curriculum and school change via technology.

Cohort Group. The target groups are school technology coordinators, library media specialists and classroom teachers who wish to enhance their expertise with technology, curriculum and school change. The participants work through a two year program as part of a 15 member cohort group. The primary criterion for admission to the program is applicants' showing evidence of their potential to be leaders and change agents in the school and district. Each participant must submit letters indicating agreement to support and collaborate from the principal and two other teachers in their school. Projects during the program involve the participants with others in their schools to implement technology curriculum and leadership projects.

Admission. Each participant is admitted into a School of Education teaching major at the masters or post-masters level. Each works with the cohort's advisory committee to design a Program Plan focusing on technology, curriculum and school change. The program may include a specified number of preplanned professional development activities as well as University credit courses. The Program Advisory Committee is made up of School of Education faculty, JCPS leadership personnel, and outside experts who may be from the Board of Education, the state Department of Education, a local business, or a national / international expert who may participate via distance technologies.

Rewards. Teachers accepted for the Technology Leadership Institute receive district-owned hardware and software for their use during the courses. These resources are purchased through state allocations for technology resources. The school district allows 18 hours of inservice credit for courses taken within this program. Classes are held at a location convenient to the teachers and are taught by district and university technology experts. The school of education attempts to streamline admission, registration and advising.

Program Design

The school of education's initiative guidelines call for a minimum 30 credit-hour Program of Study organized specifically for each cohort to include:

1. A core requirement of a Readings course and a Research course.
2. A Curriculum Project and a Leadership Project that reflect the beliefs above. The Curriculum project is intended to be a minimum of a year-long effort to improve teacher's design of lessons and the quality of work produced by their students, related to cohort themes. The Leadership project connects to the theme of the cohort and enhances the characteristics of leadership of teachers and their students. Presentation to an authentic audience is part of the requirement.
3. Planned Professional Development experiences can fulfill an equivalency of 1 to 12 hours and should reflect opportunities for classroom, school, or district impact. Experiences should be embedded in the job and closely related to both student and teacher needs, should link school/district consolidated plans and professional standards to the cohort theme.
4. Culminating exhibitions should grow out of the work done by the cohort. These exhibitions could include presentations to the candidate's School Council, the local Board of Education, a conference or workshop presentations to the faculty of the candidate's school, a university class, a community group or organization.
5. Each candidate must prepare a portfolio of evidence documenting cohort and individual work toward meeting professional standards. It should be a work in progress that evolves throughout the program, and will be assessed at various times dictated by the advisory committee. The portfolio should reflect on the cohort experience and the implications, which affect leadership roles and classroom practices. The program advisory committee determines the audience for the portfolio.

For the TLI cohort, standards-based credit courses, developed by the university and school district partners, are taught on a regular schedule. All courses are based upon the ISTE Basic and Advanced Standards for Instructional Technology Leaders and focus on teaching and learning with technology. Syllabi and course materials are to be posted on the server as the program develops. The program starts and ends with an assessment of expertise levels on the ISTE Standards. Each course assesses participant growth on its subset of standards and course products are posted to the project's web server where they may be viewed and used by others. The first five courses are typically taught by school district technology staff to provide depth of technology expertise and to closely align with district needs and directions.

Using Productivity Tools integrates expertise with word processing, database, spreadsheet and communication programs with the teachers' curriculum implementation concerns. Products include lesson plans that link to the district's curriculum, demonstrate applications of the tools and use the district's standard of Macintosh and ClarisWorks. The results of this course support the district's technology-integration curriculum and yearly student assessment.

Web Use and Publishing emphasizes understanding the capabilities of the web, searching for, developing and using web-based instructional resources, supported by Claris HomePage. Again, the district's academic and technology curricula and assessments are the touchstones for product development in an area that is new to most teachers. Participants begin their web-based portfolio in this course by developing an introductory page which links to a resume and products developed during the program.

Multimedia Use and Authoring takes participants into the intricacies of graphic, sound and video files in Hyperstudio program development. *Distance Teaching and Learning* introduces the concepts of distance-delivered resources and instruction, accesses the state's two-way interactive video system with its

lessons and resources, explores web-based curriculum including the state's new virtual high school, vitural library and virtual university efforts. Projects include lesson plans and products for classroom use. *Technical Support Skills* enhances abilities to work with computer hardware and software, including servers, to plan software and hardware purchases and installation, and to provide support for classroom and lab resources and teachers.

The other five courses are taught by university experts in technology, curriculum, leadership and research and are intended to broaden the participants' expertise in these areas. *Readings* course and the *Action Research Seminar* bring together participants from different cohorts to expand knowledge about their cohort's theme and to develop skills with classroom research. For the Readings course, virtual discussions are successfully supported by Tapped-In (http://www.tappedin.org). *Curriculum Seminar* and *Leadership Seminar* each extend over a school year, and involve teachers, principals and students in the participants' schools to plan, develop, implement and evaluate technology and curriculum change projects. As part of these seminars, participants are encouraged to actively participate and to present at the state technology and curriculum conference. *Capstone Seminar and Portfolio Presentation* provides a final opportunity to implement projects in the school and district, and to illustrate mastery of the standards through their electronic portfolios.

Evaluation

The school of education's initiative calls for a detailed timeline for each cohort that spells out continuous assessment benchmarks. Evidence is sought that the candidates have produced work that:

- is "real work for real purposes,"
- is based on research that is linked to the collaboratively determined needs of students, the candidates, schools, district, communities, and the University,
- demonstrates leadership at the classroom and/or school level is standards based, outcomes driven, and requires public performance and exhibitions of work,
- demonstrates expanded use of technology for curriculum design and invention of new knowledge,
- fosters new/deeper collaboration with local school district and professional development providers resulting in change in pre-service and professional candidate education.

Program standards are to be documented in the candidates portfolio, including a reflective component focused on what was learned and what should change.

The outcomes of the Technology Leadership Institute support the district's need to foster technology leadership in classrooms and schools, and are accomplished through a set of nationally accepted program standards. The products demonstrate application of technology in support of teaching and learning and are available to the public through the web-based electronic portfolios of the participants. Continuous assessments of courses, products and participants provide corrective feedback. It is clear that the most successful courses are hands-on and field-based.

The underlying construct of the university's initiative and of the Technology Leadership Institute is constructivism, as interpreted in the works of Phil Schlechty, Linda Lambert, Deborah Walker, and their colleagues. Through the TLI, we are observing a school district and a university school of education work to create change as the participants "make sense of their work and find challenging possibilities together" (Lambert et al. 1995). As the program evolves, it will become a constant source of opportunity for professional development "which includes participation in leadership processes, governance, observations and inquiry, co-planning and coaching, and new information - all of which are opportunities that involve authority, choice and responsibility" (Lightfoot 1983).

Conclusion

In the fall of 2000, the state adopted a standard for new and experienced teachers to use technology to support instruction, access data, enhance productivity, communicate and conduct research.

The expertise developed via the TLI becomes even more "real work for real purposes" as the participants are called upon to assist other teachers in meeting the new requirements. At the same time, the university is faced with the need to impact new and experienced teachers with these same skills. The collaboration embodied in the TLI provides a model and resources for meeting these need. This state-level change also points out the opportunity for the partners to design a continuum of technology experiences for new teachers, experienced teachers, and technology leaders.

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"The Usual Suspects": Explaining Success and Failure in Instructional Technology Consortia

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Abstract: This paper is a case study of the ADEPTT program, a three-university instructional technology consortium in western Pennsylvania, and the reasons for its relative success in gaining public and private grant funds and promoting the effective use of technology in teaching and learning. The paper examines the purposes and constraints of educational consortia, and in particular the limits to institutionally-mandated collaboration. The paper then examines the personal characteristics and social connections of members of the consortium as an alternative explanation for the relative success of the initiative. The conclusion is that success in a technology consortium is not simply a matter of finding "the right people" but also making sure that the group of "usual suspects" also have key connections to university leadership. The article concludes with recommendations concerning the building and maintenance of similar consortia.

"Major Strasser's been shot.....Round up the 'usual suspects.'
Claude Rains as Captain Louis Renault, Police Prefect of Casablanca, "Casablanca" 1943

How do we round up "the usual suspects"? With few exceptions, whenever a grant opportunity appears in the field of instructional technology, a group of "usual suspects" at three different universities appear, cooperate, write, apply and often are awarded grants as a consortium, a consortium that is now nearly three years old. We have all heard the hyperbole about technology enabling greater communication and cooperation, but how does this work in practice? An increasing number of both public and privately-funded instructional technology grants require or suggest consortia for funding (Dotolo and Strandness 1999). This paper will look at the institutional and social requirements for a successful consortium by examining the successful and unsuccessful experiences of a consortium of three public universities in western Pennsylvania

Successes and Failures

Advancing the Development of Educators in Pennsylvania through Technology Training (ADEPTT) is a consortium of three Pennsylvania State System of Higher Education universities, Indiana University of PA, Clarion and Edinboro, and fifty-three school districts. More than forty faculty, administrators and technology staff located as far as 150 miles apart are working effectively on the core planning team. Located in western PA (IUP), ADEPTT was created in February 1998 via a three-year grant funded by Bell Atlantic with a matching $100,000 gift of software from Microsoft Corporation. The overall goal of the consortium is to help K-16 teachers learn to use instructional technology as mind tools for deeper learning as we shift from an instructor-centered to a learning paradigm (Barr & Tagg, 1995). Hundreds of seats have been filled at fifty-five different workshops provided by the Consortium including basic software instruction, technology tools, videoconferencing, using technology to enhance teaching and learning, using the Web, and using Web course development software. Bell Atlantic also funded one instructional designer at the IUP Instructional Design Center for a year.

Based on a August 1999 proposal from the Consortium, the Microsoft Corporation donated additional software and site licenses valued at $385,000 to the Consortium to upgrade networks and laboratories and to provide pioneer pre-service teachers, cooperating teachers and university faculty with software.

The most recent success of the Consortium was the award in September 1999 of $1.7 million from the U. S. Department of Education to Prepare Tomorrow's Teachers to Use Technology in the Digital Age. This

three-year grant will assist us to infuse eleven key competencies needed to teach effectively with technology into core teacher education courses and eight subject areas such as music education, social studies education and so forth.

While the Consortium has achieved the successes summarized above, numerous challenges have been encountered as well. Several attempts to create a similar consortium occurred in the three years prior to its creation, all without success. During the creation of the consortium, a fourth state system university was included until several days before the grant proposal was due. But since we did not have "buy in" to the consortium concept from a top level administrator with signature authority for the ADEPTT grant proposal, that university has only a peripheral relationship with the consortium. In June 1998, the Consortium applied for a $7.5 million five-year Technology Innovation Challenge Grant which was not funded, and one university in the consortium had to drop its membership in the last days before the proposal was submitted. However, valuable lessons about how to apply for a major federal grant were learned. Additional challenges have included 1) learning to work collaboratively at the university level within a culture that rewards rugged individualism (competition), 2) identifying a plan for delivering instructional technology training effectively at the K-12 level where the culture is very different from the university culture, and 3) learning how to work collaboratively with the three intermediate units located within the Consortium.

Institutional Analysis: The First Cut

What is an education consortium? A brief definition indicates that it is "an agreement, combination, or group (as of companies) formed to undertake an enterprise beyond the resources of any one member." In education, one can further subdivide the types of consortia: Institutionally, we propose to examine the different types of consortia: pre-existing, created, vertical and horizontal.

Figure 1: Consortium Typology

	Horizontal	Vertical
Pre-existing	Examples: Schools in districts; universities in state-wide systems	Examples: Intermediate Units
Created	Examples: cooperative relations between private, public colleges and universities, or within systems that are not created by central institutional leadership	Examples: University initiatives with various local school districts

A pre-existing consortium is one in which an institutional framework already exists for collaboration, whereas a created consortium is one in which the members actively seek partnerships where none have previously existed. Horizontal consortia are those of roughly equal members, whereas vertical consortia in education involve different levels such as primary, secondary or post-secondary schools. The ADEPTT consortium contains elements of three out of the four of the cells of figure 1. The universities which formed the consortium all belong to the State System of Higher Education (SSHE) in Pennsylvania, a group of fourteen universities which has existed as a single system since 1983, and thus are for the purposes of examining the ADEPTT program represented a pre-existing, horizontal consortium. Several of the universities indicated interest in the grant Request for Proposals (RFP) and formed their own sub-set of universities, constituting created horizontal consortia. The ADEPTT program, having gained the initial grant, in turn brought in K-12 districts and units, turning the created horizontal consortium into a horizontal and vertical consortium. The distinctions here are not simply analytical; it is a major finding of this study that some types of consortia within the matrix are more likely to succeed than others.

Why do consortia form in higher education? The short answer is that by joining a consortium, its members gain access to resources that individually they could not afford, or gain them at much a reduced rate. Those resources may be directly financial, or information, documentation, training materials, discounted software, or bargaining leverage. Furthermore, as will be noted below, success in a consortium often breeds success, as the consortium's experience and reputation makes further grants and initiatives easier to obtain. Herein lies a problem, though: to benefit from a consortium, its members must first undertake the work and the risk of a consortium before the benefits can be derived and distributed. Thus, it is important, if not imperative, that a consortium's initial effort be successful if there is to be a second effort.

Although standard line authority would entail all initiatives from the State System office coming down through the university presidents and then down into their respective technology structures, the nature of the issues and the schedules of presidents have made a formal coordination mechanism of the Chief Information

Technology Officers (CITOs) of the system a necessity for communication and discussion. A similar coordinating mechanism exists for the Deans of the respective Colleges of Education at each of the system universities. Such meetings were very important for the establishment of personal relations between key people who were involved in the creation of the ADEPTT consortium, but they played almost no role in the creation or coordination of the consortium itself. The only other role played by the State System as a coordinating system in the creation of the consortium was the administration of a competitive system-wide Faculty Professional Development Council which gave modest grants to SSHE faculty, some of which focused on instructional technology issues.

Higher educational consortia face some substantial challenges at an institutional level: first and foremost, a consortium is by its nature largely voluntary, and thus one faces a situation in which normal line authority does not apply, or if it does apply can be largely circumvented by appeal to one's home institution. Consortia have difficulty ordering members across institutional boundaries to undertake tasks. Those tasks may be undertaken voluntarily, but the normal mechanisms of reward and punishment are diminished if not totally absent. A second major challenge of higher education consortia, particularly those in the same region, is the competitive nature of their constituent universities. By and large, the three universities involved in the ADEPTT grants compete for the same pool of students in western Pennsylvania, a point mentioned by one provost of the consortium during a meeting in a planning meeting. Thus, in the initial examination of the institutional bases of the consortium we have a paradox: three universities which might not otherwise be expected to cooperate do in fact cooperate quite closely on a number of projects.

The lack of line authority and the quasi-competitive nature of higher education consortia exacerbate the collective action problems encountered in any system that exists outside of a hierarchical governance structure. First and foremost among these are the "free rider" problem encountered with public goods: some members of the consortium do the work, some do not or do less, and yet all benefit equally. An opposite problem of "glory hogs" is also possible in which one university claims all of the credit for the consortium success, or one member completely dominates the decision making of the group because of size, contribution, or expertise. And since the interaction of the members is intermittent, the chance to build and institutionalize trust-based relations regardless of individuals does not regularly occur.

Finally, any consortium faces the "minimum winning coalition" issue: given the probability that a grant will be of finite size, the addition of more members of the consortium reduces the allocation to individual members, the total grant being divided by the number of members. The optimal number would clearly be one, yet the imperative frequently found in grant RFPs for a "consortium" eliminates that option. Furthermore, since the English language has a specific term for a consortium involving two members (i.e., "partnership"), a tendency for more than two members to be in a consortium also exists, yet every additional member reduces individual receipts. Geography is a problem as well, since travel times must be multiplied by the number of campuses for meetings and their distance. Calculating the distance between system campuses, one can see that natural associations lie in the western and eastern parts of the state.

Given these challenges, it is not surprising to find that the establishment of the ADEPTT consortium faced a number of fairly significant institutional barriers, and there were a number of earlier similar initiatives that failed. In 1996 a Pennsylvania "Link 2 Learn" grant that the State System office urged system universities to apply for contained the explicit provision that collaboration exist. Preliminary talks were held between IUP, Edinboro, and California University of Pennsylvania, but nothing came of it. One participant in those early talks described them as "premature" and indicated that for at least one of the universities the talks were strictly pro forma. A September 1998 video conference between a State System university and the members of the ADEPTT consortium was held largely because the former was required by the system office in Harrisburg to open up a dialog simply in order gain access to other grant funds, but did not participate. In short, technology consortium initiatives that have come solely from the top of the system have little record of success; cooperation cannot be mandated.

Social Characteristics

If a consortium cannot be created by administrative fiat, what then explains the relative success of the ADEPTT consortium? A number of personal characteristics of the ADEPTT team members were vital to consortium building. The members exhibited these characteristics both in the original team at the founding university and across the consortium.

Commitment and Persistence. The ADEPTT team members are distinguished by a capacity for long-term commitment. Not only the technology specialists, but also other key members of the consortium had a long-standing interest in the use of technology in education and in teaching in particular. On the IUP team, for example, Associate Provost Mark Piwinsky had been interested in computers since the late 1970's, when he wanted to help small colleges access the kind of computing power mainframe computers offered to big research universities. Future faculty member Steve Jackson began a programming course in 1983. In 1982, future dean John Butzow took his last sabbatical as a University of Maine faculty member at Digital Corporation, where he worked on a distance training program on laser discs and first used email. In 1985, the 4th grade son of faculty member Mary Ann Cessna brought his parents his lessons on computer basics.

The team members shared a common vision and goals for many years. In spite of intermittent financial resources, spotty administrative support, and many setbacks, the members of the IUP core team kept plugging away, working hard for the improvement of teaching and the use of technology in teaching. Their commitment was reinforced by friendships that predated the team, both at IUP and later in the ADEPTT universities, and new friendships grew out of the team's work. Years of collaboration and shorter-term heroic efforts on specific projects and proposals developed mutual trust and further solidified the team. Several interviewees noted the unique experience that being a member of this team has been for them.

The commitment they share clearly has outlasted any one project. In fact, this commitment now extends beyond each individual campus to the consortium as a whole. With new grants coming on line, an ongoing process of enculturation has become necessary to ensure that new members recognize the primacy of the consortium over individual grants and the potential of the consortium for further opportunities.

Diversity. But what made the team strong was not only what they had in common but also the diversity and complementary skills of the members. Their talents ranged from a flare for writing (Jackson, Piwinsky) to organizational ability (Cessna, Pickering, Piwinsky), budget (Norwood, Piwinsky), editing (Brzycki, Cessna, Piwinsky), inspiration and nurturing (Ausel, Cessna), and a critical eye that brought the team back to earth as needed (Ausel). Several interviewees noted that there were no battles among egos for control, but rather, the members were candid about their strengths and weaknesses and used this knowledge to assign appropriate tasks and roles. The members represented a variety of disciplines and colleges, including technology haves and have-nots, and they included both faculty and administrators.

The faculty-administrator mix was essential in a state system where collective bargaining agreements define what administrators and faculty can do. Professor Mary Ann Cessna commented, "Teams that include a mix of administrators, faculty and key IT staff are much stronger than faculty alone." John Butzow, Dean of the IUP College of Education, noted, "Administrators alone could not have done this.... You must hook faculty and administrators together in unusual ways. Mark Piwinsky played a key role in making this happen." In turn, Mark Piwinsky observed, "Big grants become *university* issues—you need to make institutional commitments

Communication and Generosity. Among the team members were also some truly great communicators. Dennis Ausel is in the Communications Media department at IUP. Mary Ann Cessna is tireless in her efforts to keep consortium members informed of ADEPTT developments. Steve Jackson is an experienced writer and debater. As comparative politics and international relations specialists, respectively, he and Mark Piwinsky are well versed in diplomacy and the communication skills it entails.

With these skills, IUP made it clear that it did not wish to dominate the consortium, and "Clarion and Edinboro were pleasantly surprised," according to Andy Lawlor. IUP took care to rotate meetings among the campuses, and the initial presentations were deliberately left unpolished so that the future partners could have real input and participation. In subsequent projects, IUP sometimes wrote in the other schools to keep them involved, even if it was doing most of the preparation.

Recognizing the importance of their team, the IUP future ADEPTT team accepted new members and tried to fold them into its unique culture—first from IUP and later from the other ADEPTT universities. They set out deliberately to make the new consortium members part of the team as well as participants in later grant proposals, placing great stock on meetings and retreats that were structured to nurture team spirit as well as accomplish immediate tasks. For the most part, these efforts have been successful and continue to this day. They were also supportive of new roles for current members of the team and encouraged professional growth.

Connections. The highest administrator on the team, Dr. Mark Piwinsky, then Associate Provost, not only shared the personal characteristics named above but was also positioned to have access to the IUP Provost and the IT officers at the future partner universities. He was already in regular communication with the IT officers on other administrative and academic technology issues, and at the time of the ADEPTT RFP, these connections influenced the choice of partners. Dr. Piwinsky chose to approach universities where he felt he

could trust the IT officers to work well together. Andy Lawlor observed, "It was not his idea, but Mark was the catalyst that brought the right people together." When the consortium proposal was funded, these connections constituted a second channel of communication that became critical in the pursuit of larger grants because these individuals could marshal resources that faculty and lower administrators could not.

Both Dr. Piwinsky and Dr. Cessna knew David Gray, Vice Chancellor for Information Technology in the State System of Higher Education prior to the ADEPTT RFP. After the award of the ADEPTT grant, this connection also proved vital in communication with such other SSHE officials as Vice Chancellor for Development Chuck Agnew, who was able to direct ADEPTT toward other opportunities.

At the grassroots level, faculty connections among the member universities were limited at the formation of ADEPTT. Those that did exist, however, served to reinforce and consolidate the expanding team. ADEPTT and PTTUT, a grant awarded to the ADEPTT consortium in 1999, have expanded faculty collaboration across the consortium universities.

Social Connections

Interviewees were asked to name, from their perspective, the key people involved in the formation of the ADEPTT consortium. Since some made a clear distinction between critical and important individuals, their responses were weighted with 2 points given for a critical individual and 1 point awarded for a merely important individual. This analysis confirmed that the interviewees were themselves key individuals in the creation and success of the consortium. The Associate Provost at IUP, Dr. Mark Piwinsky, was the person who received the highest score.

In addition, interviewees were asked to identify the people they knew, whether or not they named them as key people, from a list of some 30 individuals. Analysis of these data showed that there were several layers of connections among the more than 40 participants in the founding of the consortium: faculty to faculty, top administrator to top administrator (opinion makers), and manager/staff to manager/staff. At least two of the key faculty members had previous connections with their peers at the partner institutions as well as at other universities in and outside the State System of Higher Education, substantially easing the introduction and increasing the level of familiarity and trust between the key personnel. The opinion makers (top administrators such as Vice Presidents and Associate Provosts) had connections with each other as well as upward vertically (state system officials), horizontally (IT leaders at non-partner universities and some top administrators), and downward vertically (managers and faculty in their own universities). One key manager had connections of all three types.

Most faculty had chiefly faculty-faculty connections. The person with the most connections was, indeed, a key faculty member (Dr. Mary Ann Cessna). These relationships were vital in creating the consortium and promoting a sense of trust within the fledgling organization, but they were not in themselves sufficient to create the consortium. They also helped her recognize what kind of backing would be needed to make the consortium a reality, but she could not create it without such backing. Top administrators had the most connections after Dr. Cessna. To look for possible differences in these connections, we examined the number of relationships that involved opinion makers or people with line authority. Looking at connections with both potential partner universities and the State System, we determined that the chief IT officers had the most connections with people in line authority positions, with the three having virtually the same numbers of these connections.

Institutional Analysis, 2nd Cut

Returning to the question of how to build an effective consortium in technology, we are forced to recognize that although finding key personnel who combine both a high degree of technological proficiency and a large number of social connections within and across institutional boundaries, it would be impossible to form an effective consortium without the active support and participation of university administrators.

The pivotal nature of the IT officer is still more clearly revealed when we look at failures to expand the consortium beyond three universities. In one case, the dean of the college of education was supportive of the notion of a consortium proposal, but both the CITO and Provost positions became vacant during the proposal writing period, and the effort to bring in this university ground to a halt. In a second case, the connections were chiefly those of faculty to faculty, and again the effort bore no fruit.

In summary, the analysis of Who Knew Whom showed that chief information technology officers had the most connections with other people in positions of line authority and considerable connections with faculty. All three IT officers were also named as some of the people key to the formation and sustenance of the consortium. Among all the key people named, Dr. Piwinsky received the highest rating. Finally, our analysis showed that Dr. Piwinsky demonstrated all the personal qualities that made the consortium possible. Moreover, perhaps more than any other player, he is distinguished by the leadership ability to identify and bring together the right mix of people that can be trusted to perform under pressure, and by powerful gifts of communication, persuasion, and a team outlook. Dr. Piwinsky was the catalyst of the ADEPTT consortium--the kind of person in the kind of position that could have a formative influence on the its creation.

Lessons

1. For all of the hyperbole about technology, face-to-face interaction of consortium members is indispensable for building trust and cooperation. Thus, geographical proximity remains a substantial limit on the size and extent of any potential consortium. A willingness to travel to all consortium member universities in a rotation has been an important principle in maintaining a sense of shared burden.
2. Some types of consortia are more difficult to create and maintain than others. It has been the experience of the ADEPTT consortium that the elements of the horizontal-created consortium have worked very well. The vertical aspects of the consortium have been more problematic, and pre-existing consortia are usually too large to be effective. An optimal consortium size of about three or four major institutions in geographic proximity may exist.
3. Consortia cannot be created by administrative fiat; pre-existing groups of connected faculty, administrators and often staff must be found and brought into the creation of the consortium from the beginning.
4. The building of an effective university-level consortium must also have actively involved supporters at the vice-provost level, as well as deans and other administrators. These leaders are key to the success — or

5. Failed attempts at grant writing are not necessarily wasted time, and are often essential to later successes as experience and feedback are gained. However, an early success is essential for maintaining the consortium.
6. Technological aptitude is important for some key personnel in university teams but not all; some of the most important university team members in ADEPTT are not "cutting edge" in their use of technology but do recognize its importance.
7. A cadre of dedicated faculty, staff and administrators who have a clear sense of their roles in the grant writing and administration process — "the usual suspects" to whom the university leadership can turn to and rely upon — is the most important asset for building successful consortia.

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ICT Training and Implementation : Inseparable Activities

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Abstract. As a part of the Education Departments' Superhighways Initiative, senior secondary school staff in Northern Ireland participated in a multimedia CD-ROM based training programme on the use of computer based Management Information System software. An evaluation is offered of the impact on the school organisation, its management practice and patterns of staff use of ICT in management two years after the training event. Outcomes indicate that the opportunities for organisational development were not fully realised, suggesting that change strategies should involve attention to the totality of the relevant school system and should provide for professional dialogue and participation in the process.

Introduction

Developing teachers' professional knowledge and skills in the use of Information Communications Technology (ICT) is a priority objective for those involved in policy formation and implementation in the United Kingdom (DfEE, 1997; Scrimshaw, 1997; DENI, 1997). ICT based multimedia and communication systems can deliver directly into schools programmes of professional training which include video-conferenced tutorial support. But effective delivery presents complex technical, pedagogical and economic questions and often leaves unexamined the relationship between in-service training and the integration of new knowledge and skills into educational processes.

Translating learned skills into operational activities that impact on learning is a distinct stage which requires schools to develop management strategies directed towards the desired outcomes. Systematic evaluation needs to be undertaken to inform future training strategies. This paper addresses these concerns and aims to contribute to the debate by exploring the impact of ICT training on both individuals and their school organisations and identifies some of the pedagogical and environmental conditions, including internal and external support systems, necessary for successful implementation

The research and its context

The first phase of this research was part of the Education Departments' Superhighways Initiative (EDSI), launched in 1995 by the UK government to sponsor and evaluate 25 school based initiatives in the application of ICT (DfEE, 1995). A range of curriculum and organisational initiatives were supported in over 1000 schools across England, Wales, Scotland and Northern Ireland (Scrimshaw, 1997). In Northern Ireland: three selective and one non-selective schools were chosen, for their level of 'technological readiness'. In three of these, training was undertaken by the Senior Management Team (SMT); in the fourth, by the Pastoral Care Team, a total of 28 teachers (including 3 Principals and six Vice-Principals). Approximately half of the teachers considered themselves to be non-users of ICT (see North 1997). Two years later, a follow-up study examined the effects of that training experience on management practice, routine use of computer-based information systems and school-based decision-making.

Methodology

The study draws upon teachers' perceptions of the training experience as well as their understanding of the outcomes. Data was obtained from questionnaires, interviews and observations. Unstructured and semi-structured interviews were conducted with key participants. Observations of learning situations and staff planning and development meetings were recorded. Data were also collected through the self-reporting of teachers Two questionnaires were administered to provide additional data on specific individual attitudes and outcomes.

Research outcomes

Impact of Training

The pilot training project made an immediate impact both on individuals, in terms of personal and professional development, and on the school as an organisation. It successfully equipped teachers with new ICT operating skills and knowledge, and contributed towards their personal growth, conferring in particular an increased sense of professional status and an increased confidence in their use of educational technology. A contribution towards further organisational growth was made through increased engagement of teachers in school-based issues and an improved corporate understanding, expressed in the sharing of knowledge and suggested improvements based on team work. Although evidence of these positive outcomes can be found in each of the schools, they were not acquired in each to the same degree. Schools whose organisational environment promoted professional dialogue, exchange of information and also valued professional development appeared to benefit most (North, 1997).

Implementation

The implementation phase of the project began about nine months after the completion of the training programme. On completion of their training programme, teachers in three of the four project schools appeared enthusiastic at the prospect of collectively utilising their newly acquired skills and knowledge. They were also eager for upgraded equipment to arrive, making possible development of a deeper understanding of how a Management Information Data Access System (MIDAS) could be used to improve the effectiveness of their schools. During the two year implementation period there were eleven personnel changes among the 28 original participants, including retirements, new appointments and post changes. Implementation was externally supported only by the installation of the networked hardware and MIDAS software. Schools were left to decide for themselves how to locate and use their new facilities.

The Management Information system is generally perceived by schools in Northern Ireland as an adjunct to administration. Not surprisingly, therefore, most of the networked stations were actually located in the offices of Principals, Vice-Principals and school secretarial staff. Each school also located a station accessible to members of the Senior Management Team. School C, however, which focused its training on the SMT and the Pastoral Care team, purchased eight additional stations from school resources to ensure easy access for all members of the team. Each of the four pilot schools provided participants, now totaling 25, with access to a networked PC, but levels of access to the MIDAS system itself varied from school to school.

Most teachers used the MIDAS system daily (14), and a few did so weekly (3), less than once per month (2) or monthly (1), although five teachers made no use of it. In school D, the SMT teachers did not use MIDAS themselves but telephoned the school secretary to ask her to access the system for required information ("It was quicker than starting up our machine"). Locating pupils in the school was the only MIDAS function used by all four schools. (MIDAS provides a pupil record which includes a photograph, personal details and an individual timetable.) Some teachers used MIDAS for staff information (9) and examination analysis (7), and a few for discipline (3) and subject-related matters (2).

By far the greatest perceived benefit from using MIDAS was the time saved accessing required information (18). MIDAS, compared with the paper-based pupil record system, was perceived as providing information quickly and from widely distributed access points. Perceived educational benefits were most apparent to the pastoral team in school C who cited reduction of time spent locating pupils. "MIDAS reduces the time spent on administrative chores and therefore frees up time for other activities", was a typical response. Most respondents (16) said that MIDAS software had replaced a manual retrieval system (see North, 2000).

Discussion

Recent experiences of these four 'technologically ready' and well-resourced schools offer important lessons for those responsible for the development of in-service training through independent learning systems. Although each school operated in isolation from the other pilot schools, the pattern of MIDAS us was similar in each. The schools' responses, however, as evidenced by self-reporting of changed activity, suggest that to decouple training and implementation leaves organisational understanding and practice largely unaffected. In the case of the four participating schools, these deficits manifested themselves in the following ways:

Under-utilisation of software

The most striking revelation of the study is schools' under-utilisation of software capabilities. Several change-inducing ingredients, motivational, cognitive and technical, were in evidence after completion of the training programme. For example, teachers believed themselves to be competent in the required skills, were enthusiastic and motivated by the perceived potentialities of the system and were supported by adequate hardware and technical support structures. However, the MIDAS software was only used for those functions which accessed the school's existing database. Although each school understood and valued the potential of a fully functioning system, they had not invested the required human resources or made necessary organisational changes to enable the full capabilities of the system to be fully realised. To benefit fully from MIDAS, schools would need to input updated pupil data daily and convert existing paper-based recording practices to an electronic medium. Teachers themselves were also unwilling to relinquish their personal paper-based records and entrust key tasks to a system subject to the requirements of the Data Protection Act. None of the schools used the MIDAS financial analysis module. In part, this was due to an unwillingness to shift from a current EXCEL-based system (two schools) and, in all schools, to a failure to integrate analytical financial data into the SMT's routine decision-making processes.

Lack of access to hardware

In three of the four schools, the location of hardware was concentrated in the offices of the Principal and administrative staff. This localisation not only reduced accessibility for other members of SMT but also signalled the Principal and school administrative staff as the significant system users. In two of the schools where this localisation was most intensive, only the Principal and one Vice-Principal used MIDAS. The interest, enthusiasm and sense of corporate identity claimed by SMTs after completion of the training phase seemed to have disappeared.

Limited use of ICT

There appeared to have been little extension of teachers' use of ICT for teaching purposes, attributable to their training experience on MIDAS. One teacher had begun to use a CD-ROM as part of an information-gathering exercise by pupils. The belief that the training experience would motivate teachers to develop their ICT skills and incorporate ICT in their teaching was not realised. In two schools, five teachers began to use video conferencing and there was a perceptible increased use of IT for professional tasks. It is likely that these developments are no stronger or more firmly focused than would have occurred in any case, owing to the prevailing 'social climate' of greater readiness and opportunity to make use of ICT facilities.

Limited impact of further training

One of the arguments for independent multimedia training is that it offers the opportunity for teachers to re-visit the training medium to develop their skills and knowledge further and for new members of staff to acquire the necessary operating skills. However, it was found that none of the new appointments to school used the MIDAS CD-ROM to acquire the skills - in the case of school C the three newly appointed pastoral team members were trained in the traditional 'cascade' manner by being shown how to operate the system by a helpful colleague. It is interesting to note that this Just-in-Time training took, on average, only thirty minutes. This compares with an average of three hours for full training but included only the module on pupil records. Twenty of the 25 teachers had not used the MIDAS CD-ROM since the training programme: three claimed they had done so.

Limitations of the training model

The inefficiencies and ineffectiveness of implementation are also due, in part, to the limitations of the training model and in particular to its reliance upon on skills acquisition through simulation, rather than through use of a school's real data. There were instances, for example, of teachers wishing to input school data but feeling insufficiently equipped to do so. A training requirement for participants to engage with a school's own data would introduce confidence and skill-forming incentives. Surprisingly, since no teacher had used more than a small part of software, when asked to rate their level of competence on a five point scale in the use of MIDAS, fourteen teachers rated themselves as 'highly competent', five as 'adequately competent', six as 'not competent'.

Personal and Professional Benefits

There were some gains in both improved attitude to ICT and small gains in increased usage of ICT. Most teachers claimed that the MIDAS training programme increased their ICT knowledge and skills and a heightened awareness of the potential uses of IT in educational settings. Two years after the training programme, nineteen teachers were using IT in a professional capacity, compared with fourteen before training. Six remained non-users. Individually, teachers mentioned their increased willingness to promote increased understanding of IT and the improved confidence among (some) senior staff in the use of IT. Four teachers, however, could perceive no benefit. A range of uses was identified, chief of which was management and administration. However, only one additional teacher claimed to be using ICT in the classroom, although there was a significant growth in the number of applications used. Five teachers had used the video-conferencing facility since the completion of training. All reported that objectives had successfully been met, although in each case only the basic image-dialogue function was used.

Conclusion

Training and implementation should be seen as inseparable processes. Decoupling the activities that sustain them leads to ineffectiveness, inefficiency, and leaves organisational practices largely unchanged. Necessary incentives for staff to change themselves, by undertaking self-directed school development tasks through programmes of professional self-development are removed when training objectives and processes are isolated from considerations of organisational development. Skills training programmes will not by themselves bring about professional and organisational change. The limitations identified in the CLASS project strongly indicate a need to examine alternative models of the change process in relation to ICT development and implementation in schools.

The model underlying the CLASS training reflects a Research, Development and Diffusion model (R, D and D). Strong on internal coherence, as befits its empirical-rational strategic foundations (Chin & Benne, 1974), such a model highlights the rationality inherent in an objectives-driven strategy that ignores the constitutive elements and interrelationships inherent in the diffusion process. This 'weak link', at the interface between institutional culture and experience (Becher and Maclure, 1978), allows the possibilities of changing school practice to remain unexplored.

If the diffusion strategy was designed to match a more comprehensive understanding of training processes and their link with institutional practice and renewal, dissemination strategies would have to be redesigned to confront and incorporate aspects of what Havelock (1973) termed the 'social interaction' model. There, the user is a change agent and change strategy incorporates provision for normative-re-educative experiences (Chin and Benne, 1974). These principles should also formatively influence the design, development and production of Management Information software.

In the case of the CLASS project, training was designed to employ a combination of 'Pressure' (school and individual exposure to testing and possible publication) and 'Support' (provision of CD-ROM, technical expertise and a facilitative training environment). Thus linking empirical-rational and power-coercive approaches to meet training objectives. After training was completed, implementation languished, though the essential framework and nourishment of physical and technical support were fully provided. Nevertheless, staff used elements of the new ICT facilities, when they perceived an immediate individual benefit of saving time required for carrying out existing professional tasks. Readiness to adopt the new technology was prompted by perceived efficiency gains. This is very much in-line with the findings of Wild (1992) during an evaluation of a LEA initiative in the use of computer-based management information systems. The 'natural growth' that did occur showed that schools adapted the training to their needs by achieving the greatest return with the least investment of their own time.

These findings lend support to an important and already established principle (Dalin, 1978) that for effective ICT development to take place, attention must be paid to the totality of the relevant system and, in school settings, incorporate a strategy of vertical, as well as horizontal professional dialogue.

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ATTITUDES TOWARDS USING COMPUTERS IN ADMINISTRATION AMONG SCHOOL ADMINISTRATORS

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Abstract: The purpose of this experiment os to examine variables that could influnce the attitudes towards computers adninistrators in Malaysia. The variables investigated in this experiment were gender, age, computer skills and experience, and computer access and training. The instrument used for this experiment is the Computer Attitude Scale (CAS). The CAS is a 40-items instrument that is divided into four, 10-item sub-scales: Computer Anxiety, Computer Confidence, Computer Liking and Computer Usefulness. These four sub-scales were used to describe the four dimensions of attitudes toward computers. The findings significantly revealed that computers access and training, statistically influnced attitudes towards using computers, whereas gender, age, computer skills and experience did not. Therefore, the conclusions and recommendations based on the findings of this experiment indicated that proper training and better computer facilities should be provided by the authorities to teachers and school administrators in order to enhance the computer usage in schools and to increase the integration of information technology in education in Malaysia.

INTRODUCTION

The use of information technology (IT) in school administration is no doubt will be a plus factor for any school. According to Tofler (1991) when society have moved to IT, computer will be the tool for the societies. As for technologies, the advantage will largely depend on the usage. Correspondingly, users need to be well-verse. The government of Malaysia through the Ministry of Education (MOE) has embarked to introduce computer literacy in 60 schools throughout the country in the early 1990. This is followed by another 100 schools. Beside this, the MOE has started the Sekolah Bistari or Smart School concept. The Smart School has become one of the flagship application of the Multimedia Super Corridor (MSC) project.

Based on the Smart School Working Committee (1997), the rearrangement of school administrator to use IT will improve the administrator managing the school. The usage of computers will help the administrator manage, plan and allocates human and physical resources effectively. A lot of efforts have been done to install and provide Information Technology (IT) to each participating school. Many seminars and workshops are being conducted in discussing the usage of computers in teaching and learning, as well as in the improving the curriculum material.

Despite of the above, the usage of IT by school administrator is rarely discusses in Malaysia. We feel that in stressing of smart school teaching and learning, the aspects of school administrator usage of IT

should be emphasized. We managed to cover several studies by Chong (1995), Liong, Gan and Noran (1995) and Zainuddin (1997).

THE EXPERIMENT

Research conducted by Pelgrum and Plomp (1993) in Computers in Education Studies (COMPED) organised by The International Association for the Evaluation of Educational Achievement (IEA) among 22 countries througout the world conclude that schools that use computers in their administrative indicate an increase in the school administration.Most school administrator also have this preception and hope that by using computers in their teaching and learning will increase schools and students performance.

Pelgrum and Promp (1993) also found that training in the use of computers needs to be considered for the effectiveness of using computers in school. This finding is being supported by another research conducted by Bird (1991) in England through Computer Assisted School Administration (CASA). The findings stress that school administrators needs to be given training in using computers beside having a fully equip hardware and software. While Kristiansen (1991) view that attitudes and confidence is an important factor in determining the use of IT in education. Computer attitudes is a difficult and complex entities to measure. However there are various instruments to measure it.
Loyd & Gressard (1984a, 1984b), Loyd & loyd (1985), Koohang (1987) have found that several factors influence the attitude of user to computers such as sex, age, training, post (designation), family background, access to computer, skill and experience in using computer. Loyd & Gressard (84a, 84b) have use computer anxiety, computer confidence, computer liking and computer usefulness in their research. All these factors are relevant to the experiment that we are going to conduct. All these experiments were conducted in USA and Britain but not in Malaysia.

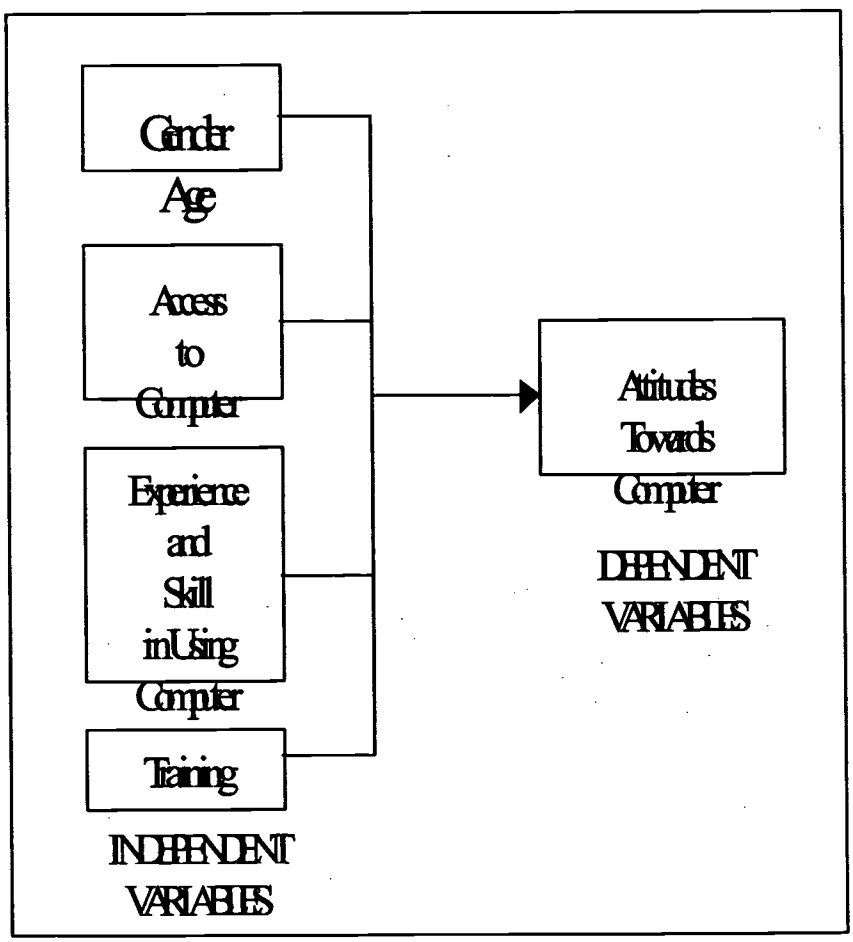

Figure 1: Conceptual Framework Model of the Experiment

Attitudes towards computer can be measured using Computer Attitude Scale (CAS) by Loyd and Loyd (1985). This view was also supported by research done by Gunter (1994) on work done by Kluever et. al (1992) and Bandalos and Benson (1990). They found out that CAS has high consistency rate of between 0.80 to 0.90. A experiment by Shaft and Sharfman (1996) found out that their instrument Attitudes Toward Computers Instruments (ATCI) and Attitudes Towards Computers (ATCS) by Reece & Gable (1982) and CAS has a high correlation which is r=0.82. This suggest that all 3 instruments can measure the same dimensions.

SCOPE LIMIT

We have limit our experiment based on the following limitations:

i) we choose our respondents at random, any conclusions and recommendations derive from this experiment should apply to the same population criteria
ii) we only experiment 4 factors that is gender, age, computer skills and experience, and computer access and training in using computer
iii) access to computer includes facilities to the computer at home or school. Whether the respondents use the computer or not is not included in this experiment
iv) Different in computer facilities at school may influence the administration in using computer for administration. This factor is not studied.
v) There are other factors that can be used to experiment computer access and training. This factors are not included in this experiment.

Our dependent variables contain 40 items with Likert scale of 4 points. These 40 items are divided into 4 sections namely computer anxiety, computer confidence, computer liking and computer usefulness. The 4 independent variables are gender, age, computer skills and experience, and computer access and training. Figure 1 depicts the conceptual framework model that we conduct our experiment.

THE METHOD

Respondents are chosen at random from the various primary (elementary) and secondary (high) schools in urban and rural areas. Stratified random sampling is been used to determine the sample size. Questionnaires are posted and collected personally on a pre-determined date. We use Lakers scale of 1 to 4 for each questions.

DATA ANALYSIS

Descriptive statistical analysis were used to describe the respondents and the population whereas inferential statistics are used to describe and explain the relationships between independent and dependent variables.

FINDINGS

We distribute 100 questionnaires to the various respondents identified and we manage to collect 81 sets, which represent 81% of the population. According to Sakaran (1992), the return of 70% of the population is justifiable to conduct a statistical analysis. Our respondents were 51.9 % male and 48.1% female. Age group are as follow: Below 30 years 25.9%, 30-40 years 50.6%, more than 40 years old 23.5%. Respondents that have computers at home are 58% compared to 42%. Respondents that use computers at school are 82.7% compared to 17.3%. Numbers of respondents having experience and expertise in using computers is for novice is 43.2 %, middle user 49.4 % and 7.4 % for expert users. This indicates that many respondents (school administrator) are average computer users. On the training side 45.7 % respondents have training and 54.3 % have no formal training. The number of training that the respondents received are as follows 54.3 % - no training, 27.2 % - 1 training, 6.2 % - 2 trainings and 12.3 % -more than 2 trainings.

In our further statistical test, we obtain a mean value of $\mu = 98.07$ for male and $\mu = 94.05$ for female. T-Test analysis is conducted which indicate the rejection at the confidence level of 95 %. This indicates

there is no significant in attitudes between male and female respondents. This is consistent with the findings of Woodrow (1990, 1991, 1994), Busch (1995), Pelgrum and Plomp (1993), Kluever et. al (1995) and Willis (1995).

A One Way ANOVA with a significance level of 95 % was conducted to compare the different mean for attitude among the respondent based on the age group. Although generally the test indicate that the mean value for the younger age group is high for all the sub-scale on computer anxiety, confidence, liking and usefulness, there is no significant difference among the age group at significance level of 95 %. This indicate there is no significant different for computer attitude among school administrator in using computer. This findings justify the findings by Woodrow (1990), Kluever et. Al (1995) and Willis (1995). The result might be due to the small age gap among the age group. Other researcher used a bigger age gap between each age groups as done by Robertson et. al (1995) .

t-Test analysis indicate that the mean value for attitudes toward computer is higher for school administrators who have access to computer (μ=99.97) compared to (μ=92.73) and significant at 95% level of significance for Confidence, Liking and Usefulness except for Anxiety sub-scale. Therefore we can conclude that there is a significant among school administrators who have access to computers compared to those who do not have access. This indicates access to computer can increase the attitudes toward computers because it can provide experience and confidence in using computers. This finding agrees with the findings done by Lioa (1993).

Mean comparison between respondents that have basic, intermediate and expert skills users indicate that intermediate skill users have the highest attitudes for computer (μ=97.7) followed by expert skill users (μ=95.5) and basic skill users (μ=94.4). Although there is significant difference in mean at sub-scale Anxiety and Confidence but a One Way ANOVA test indicate there is no significant difference at 95% significance level generally for all sub-scale. This indicates there is no significant between school administrators that have basic, intermediate and expert skills users in using computer in school administration. These findings do not agreed with that of Loyd and Gressard (1984a), Comber et. al. (1997), Chen (1986), Koohang (1987, 1989), Gardner (1993), Liao (1995) and Huang et. al. (1995). What we can conclude about these unmatched findings are that there is an obvious different between the number of respondents in computer experience where the expert skill group is 4% compared to the other groups which is more then 40%. Beside that evaluating expertise is quite subjective in this case.

Mean analysis for attitude towards computer indicate that respondents that have computer training is high (μ=99.78) compared to those who do not have computer training is (μ=93.06). This is further strengthen by t-test which indicate there is significant at 95% level of significance for all sub-scale except Anxiety. This result is also supported by test conducted based on the numbers of computer training that respondents have gone. This can be translated that there is a significant different between respondent that has computer training compared those who do not have computer training. This result agreed to the finding done by Gressard and Loyd (1985), Reed (1990), Anderson and Hornby (1996) and Kluever et al. (1995)

Person Correlation Analyst is used to compare the relationship between the above variables and there is significant relation using 95% level of confidence between sex, access to the computer, training and skill. These support the finding done by other researchers which state that computer training and access can improve the computer skills and improve the attitudes toward computer.

Linear regression analyst using multiple regression is used to see the relationships and strength between dependent and independent variables. Our findings indicate that access to computer (β=-8.06) and training (β=-6.53) is the most important factor that affects the attitudes towards computer with significance at 95% level of significance. This is followed by sex factor (β=-3.96), age (β=-3.11) and skill (β=-2.34). This finding justify the findings done by Gressard and Loyd (1985), Reed (1990), Anderson and Hornby (1996), Huang and Pardron (1995) and Kluever et al. (1995)

CONCLUSIONS

Attitudes towards computer is among the most important factor in indicating a person acceptance in using computer. Our findings have found that access to computer and computer training are the most

important factor in determining the attitudes toward computer. These are proven by the regression analysts conducted by comparing the various factors. Access to computers also indicate an obvious different in attitudes toward computer and all the attitudes sub-scale towards computer. This statement is supported because most respondent have access to computers either at home or school.. Other findings also indicate the longer a person used a computer, the more confident he has in using computer. This increased his experience and attitudes toward computer.

Another factor that we can conclude is the training factor. Respondents that have undergone training show a more positive attitude then those who do not have training. This experiment also indicates that many school administrators did not have computer training although they might have access to computers. This indirectly have an effect on their attitudes toward computers.

Finally, we recommend that school administrators should have access to computers either at home or schools. Beside that they should be given more computer training by the government.

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